

# **EXHIBIT G**

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INTELLECTUAL CAPITAL EQUITY



**OCEAN TOMO**

INTELLECTUAL CAPITAL EQUITY

**ORACLE AMERICA, INC.**

**v.**

**GOOGLE INC.**

**CASE NO. CV 10-03561 WHA**

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**RESPONSIVE EXPERT REPORT OF JAMES E. MALACKOWSKI**

**[CORRECTED]**

**February 29, 2016**



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## 1. FIRM BACKGROUND AND QUALIFICATIONS

1. My background and qualifications are set forth in my prior report dated January 8, 2016.

## 2. ASSIGNMENT

2. Ocean Tomo was retained by Orrick, Herrington & Sutcliffe LLP (“Orrick”) counsel for plaintiff, Oracle America, Inc. (“Oracle” or “Plaintiff”), in connection with this matter in July of 2015. Ocean Tomo has been asked to evaluate the amount of monetary recovery due to Oracle for Google Inc.’s (“Google” or “Defendant”) infringement of copyrights in the Java platform (“Infringed Java Copyrights”) in connection with Google’s Android platform for use in mobile phones and other devices.
3. In connection with my assignment in this matter, I issued an expert report on January 8, 2016 which provided my opinions regarding the amount and type of losses suffered by Oracle, as well as the non-apportioned revenues and profits generated by Google that, in my opinion, meet the causal nexus test (“Initial Report”).
4. As explicitly stated in my Initial Report, as of the date of that report, I had not addressed the issue of apportioning Google’s profits which meet the causal nexus test between infringing and non-infringing attributes of the Android Platform, referred to generally as Google’s causally connected profits. Rather, I expected to offer such opinions in a later report, as set out by the three-part damages report schedule in this case.
5. This is that “later report” and therefore it reflects my opinions regarding the apportionment of Google’s causally connected profits. In addition to addressing the apportionment of Google’s causally connected profits, this report also provides responses to several opinions put forth in the report submitted by Google’s damages expert (Dr. Gregory Leonard) on February 8, 2016 (“Leonard Report”).
6. A detailed listing of the documents reviewed by Ocean Tomo since the issuance of my Initial Report is included in the footnotes to this report and/or the summary provided in **Exhibit 2**. References to documents and testimony herein are meant to provide examples of supporting information, but are not intended to be a comprehensive or exhaustive listing of all known support or to signify a heightened level of importance. In addition to this report, I may rely on video excerpts taken from videotaped depositions and/or demonstrative exhibits that illustrate the concepts and conclusions contained in this report. Such excerpts and/or demonstratives have not yet been prepared.
7. The opinions discussed throughout this report are based on my current understanding of the facts and circumstances surrounding this matter, my review of the produced documentation, testimony, third party and public information available to date, the legal framework for copyright remedies, and any underlying assumptions upon which I have relied. As such, the analyses and opinions described herein are subject to change based upon additional discovery or any other relevant development.



8. In connection with my work in this matter, I have assumed the Infringed Java Copyrights are copyrightable and have been infringed. That assumption is made exclusively for the purpose of determining the appropriate measure and amounts of monetary recovery, and in no way represents any form of legal conclusion.

### 3. SUMMARY OF OPINIONS

9. As stated in my Initial Report, I understand Oracle is entitled to the amount of actual damages it has suffered as a result of Google's infringement, as well as any profits earned by Google which are attributable to its infringement, but not already taken into account in computing Oracle's actual damages.<sup>1</sup>
10. As also stated in my Initial Report, at a minimum, Google's infringement of the Java Copyrights resulted in Oracle losing licensing revenues from third-party license agreements and also prevented Oracle (or its licensee) from launching a new mobile platform. In my Initial Report, I determined that Oracle's lost profits from lost Java ME license agreements with third parties totaled \$475 million. I also concluded that, while I was unable to quantify with reasonable certainty Oracle's lost profits resulting from it having been prevented from launching a new mobile operating system, nor any other component of potential loss, I was confident that such losses had in fact occurred. While the Leonard Report rebuts my opinions related to Oracle's losses, as discussed later in Section 5, my opinions in that regard remain unchanged.
11. My Initial Report also quantifies the amount of total profit Google realized as a result of the infringement of the Java Copyrights by the Android platform. In that report I noted Google has generated Android-related revenue and profit which is attributable to the Infringed Java Copyrights, including: advertising revenues associated with Android devices; sales of Applications and Digital Content through Android Market/Google Play; and sales of Google's Nexus devices. Although Oracle was only required to present proof of the infringer's gross revenues at the time of my Initial Report, I nonetheless included in my analysis all of the costs and expenses which I believe should be deducted from those gross revenues. While the Leonard Report responds to my opinions regarding the causal nexus between certain of Google's revenues and the Infringed Java Copyrights, and the amount and type of costs I have subtracted from those revenues, with the few revisions reflected herein, my opinions in that regard remain unchanged, as discussed later in Section 4 of this report.
12. Since it is Defendant's burden to establish an apportionment of profits between infringing and noninfringing attributes, my Initial Report did not offer any opinions regarding the portion of Google's profits which related to infringing attributes of the Android Platform. Rather, I deferred the proffer of any such opinions to the issuance of this report.
13. In connection with preparing my opinions on the issue of apportionment, I have considered the opinions put forth in the Leonard Report. I conclude that Dr. Leonard's "bottom-up"

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<sup>1</sup> 17 U.S.C. §504 – Remedies for Infringement: Damages and Profits.



apportionment approach is fundamentally flawed in that it reflects an attempt to quantify Google's "unjust enrichment," as opposed to more properly measuring the portion of the profits actually generated by Google which can reasonably be attributed to the infringing attributes of the Android platform versus the noninfringing attributes.

14. I further find Dr. Leonard's reliance on a "counterfactual" world to evaluate disgorgement undermines any reliability of his opinions, since the Court has previously ruled in this matter that such an approach is inappropriate when evaluating disgorgement of profits, and also given the purpose of the disgorgement of profits remedy as I understand it. My opinions in that regard are detailed in Section 4.
15. I also find Dr. Leonard's calculation of expense deductions to be unreliable in that it improperly allocates certain costs to the Android business, while overstating others. Notably, Dr. Leonard has included certain costs in his profit calculation that his former colleague and Google's prior damages expert (Dr. Cox) did not. I also believe that Dr. Leonard's approach to allocating G&A costs based on engineering headcount is cursory and unsupported. The Court's prior orders also require a causal nexus between revenues and expenses in order to support such deductions; I find no basis in what Dr. Leonard has set forth to establish such a nexus. My opinions in that regard are detailed in Section 4.5.
16. With specific regard to the "top-down" and "bottom-up" apportionment methodologies put forth in the Leonard Report, I believe neither reflects a reasonable basis by which Google's causally connected profits can be apportioned. With specific regard to the "top-down" approach, Dr. Leonard's "lines of code analysis" is factually unfounded based on analysis of the code performed by Oracle's technical experts and more importantly, runs contrary to my understanding of how to apply the relevant case law in that it is a mechanical approach that fails to properly account for the relative contribution of the Infringed Java Copyrights to the success of the platform under the actual business circumstances faced by Google. With regard to Dr. Leonard's cost-based "bottom-up" approach, he fails to recognize the difference between cost and value, fails to recognize the importance of Google's timely market entry and fails to recognize that this Court has already rejected a cost-based analysis for the purpose of apportioning Google's causally connected profits. Cost avoidance is a theory of unjust enrichment rather than disgorgement of profits. My opinions in that regard are detailed in Sections 4.6 and 4.7.
17. Given Google's failure to put forth a reasonable apportionment methodology, I have performed my own apportionment analysis which measures the Platform Contribution provided for by the Infringed Java Copyrights. My determination of the Platform Contribution is based on a weighted average analysis of what Google pays to others for the contribution of their non-Android mobile platforms in connection with generating search advertising revenue. I find that arms' length market-based negotiations provide objective evidence that mobile platforms contribute approximately 36 percent of value to mobile advertising.
18. My opinion is consistent with the legal theory of commingling in that it reflects 100 percent of the value of the Platform Contribution. Commingling occurs when the infringer has mixed the infringing and noninfringing attributes in a way that makes it difficult or impossible to separate out



the respective contributions of each to overall profits attributable to the accused work. I find application of that legal theory would be appropriate in this case because Google knowingly assumed the risk of its failure to obtain a license and created the scenario whereby the relative contributions of the 37 Java APIs (“Java APIs”)<sup>2</sup> to the total Platform Contribution are difficult to discern. My opinion is also consistent with the overall business circumstances. As previously described, Google faced an extremely competitive landscape with a very limited window of opportunity, and had to obtain the cooperation of numerous other business actors in order to make a successful launch of the Android Platform. Those business actors were familiar with (and comfortable with) Java in mobile phones. Java represented a significant portion of the market at the time, and Google overtly capitalized upon that familiarity and comfort with the very important audience of carriers and OEMs. Furthermore, the technical expert evidence also shows that Android and its most important applications are dependent upon the Java APIs, that the Java APIs provided stability to the Android Platform during the critical launch period, and that the Java APIs are centrally important to the Android Platform. Under these circumstances, use of the commingling legal theory is appropriate because the Java APIs are properly viewed as a “gating item” to the Android Platform. Examples of certain presentations I have reviewed are provided below and a summary of all the presentations I have reviewed to date can be found in the Exhibits attached to my report.

- In a 2006 pitch to T-Mobile, Google states “Supporting Java is the best way to harness developers: The wireless industry has adopted Java, and the carriers require its support” and plans to “leverage Java for its existing base of developers.”<sup>3</sup> Additional slides include reference to Android Runtime including Core Java libraries and Java Virtual Machine; application level Java interface to telephony sub-system, standard Java class libraries, Java developer tools, Java application framework, and a constrained time frame.<sup>4</sup>
- In 2006, a presentation made to LG included references to a “powerful, simple Java Application Framework”<sup>5</sup> and “Standard Java Class libraries; MIDP 2.0 support.”<sup>6</sup> Also a presentation made to BenQ listed references to specific JSRs, J2ME and CDC 1.1.7

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<sup>2</sup> I understand ‘37 Java APIs’ to refer to the declaring code and the structure, sequence and organization of the 37 Java APIs packages at issue.

<sup>3</sup> GOOGLE-24-00147891, slide 39.

<sup>4</sup> GOOGLE-24-00147891, slides 40, 56, 59, 60, 71, 73 and 77.

<sup>5</sup> GOOGLE-24000152227, p. 3.

<sup>6</sup> GOOGLE-24-00152227, p. 25.

<sup>7</sup> GOOGLE-24-00013099, p. 7.



- Android overviews touting a “powerful simple Application Framework”<sup>8</sup> and a Telephony middle layer with Java at the phone application layer<sup>9</sup> were presented to LG<sup>10</sup>, Asian OEMs<sup>11</sup> and Qualcomm.<sup>12</sup>
19. Based on the outcome of that analysis, it is my opinion that the amount of Google’s profits which meet the causal nexus test and are related to infringing attributes of the Android Platform is \$8.8 billion. My apportionment methodology and related opinions are detailed in Section 7 of this report.
20. A summary of my current opinions regarding Oracle’s actual damages and the portion of Google’s causally connected profits which relate to the Infringed Java Copyrights is provided in the following Figure.

**Figure 1**  
**Summary of Opinions**

<u>Measure of Monetary Recovery</u>	<u>Amount (in Billions)</u>
Oracle's Actual Damages	\$0.475
Profits Apportioned to Infringed Java Copyrights	\$8.829

21. The specific bases for my opinions are provided throughout the remainder of this report and my Initial Report as well. In summary however, my opinions are supported by each of the following facts:
- The Infringed Java Copyrights were critically important to the timing of Google’s launch of the Android platform, especially considering the business circumstances at the time and the nature of platform economics outlined by Dr. Jaffe in his report.
  - Google’s strategy in launching Android as a mobile platform was to ensure a continuing revenue stream from its search services in connection with mobile advertising. Mobile search has generated significant advertising revenue and profit for Google, and the Android platform is a critical component of Google’s overall mobile search business.
  - The Infringed Java Copyrights are necessary for and critically important to the ongoing operation of the Android Platform and its applications.

<sup>8</sup> GOOGLE-03-00146539, p. 3.

<sup>9</sup> GOOGLE-03-00146539, p. 19.

<sup>10</sup> GOOGLE-01-00066237 and GOOGLE-01-00066262.

<sup>11</sup> GOOGLE-03-00139402.

<sup>12</sup> GOOGLE-03-00146539, GOOGLE-03-00147537.



- Absent Google's use of the Infringed Java Copyrights, Sun would have generated significantly more licensing revenue at least from its Java ME platform.
  - Absent Google's use of the Infringed Java Copyrights, Sun was strategically positioned to introduce a successful mobile platform, either itself or through a licensee.
22. As seen in the sections that follow, this report first provides a response to certain opinions put forth in the Leonard Report. That response begins with a discussion of certain methodological errors reflected in the Leonard Report before moving on to discuss certain inadequacies in Dr. Leonard's opinions relating to the identification, quantification and apportionment of Google's causally connected profits. Next, I respond to Dr. Leonard's opinions regarding Oracle's lost profits, as well as several technical issues upon which Dr. Leonard has opined. Finally, I consider my initial opinions in light of Dr. Leonard's views, and put forth my responsive opinions regarding the portion of Google's causally connected profits which relate to the infringing attributes of the Android platform.

#### 4. RESPONSE TO DR. LEONARD'S UNJUST ENRICHMENT OPINIONS

##### 4.1 Dr. Leonard's Summary of My Causal Nexus Analysis is Incorrect

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23. Dr. Leonard states:

*Mr. Malackowski's causal nexus argument can be summarized as follows: if the allegedly infringing material were removed from Android (and Google was not allowed within the counterfactual to adjust Android in any way,) Android would not work, and Google would not earn any of the associated revenues and profits.<sup>13</sup>*

This is a gross oversimplification of the opinions put forth in my Initial Report, particularly with regard to Section 11.1 in which I describe (in detail) how the Infringed Java Copyrights are causally connected to the Android profits.

24. Dr. Leonard ignores both the technical evidence and the business evidence. I relied not just upon the notion that Android would not work without the Java APIs, although that certainly is true based upon the findings of the technical experts - including Google's own technical expert Dr. Astrachan.<sup>14</sup> Beyond that causal relationship, there is also the technical work done to show that the Java APIs are central to the Android Platform and important applications, including Google's applications, and that they lent a great deal of stability to the platform during its critical launch window.<sup>15</sup>
25. Dr. Leonard also ignores the fact that the carriers were familiar with, and already dependent upon, Java-based systems, and considered Java the dominant mobile platform at the time Google was

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<sup>13</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 15.

<sup>14</sup> Rebuttal Expert Report of Dr. Astrachan, February 8, 2016, ¶¶ 61, 63 and 82.

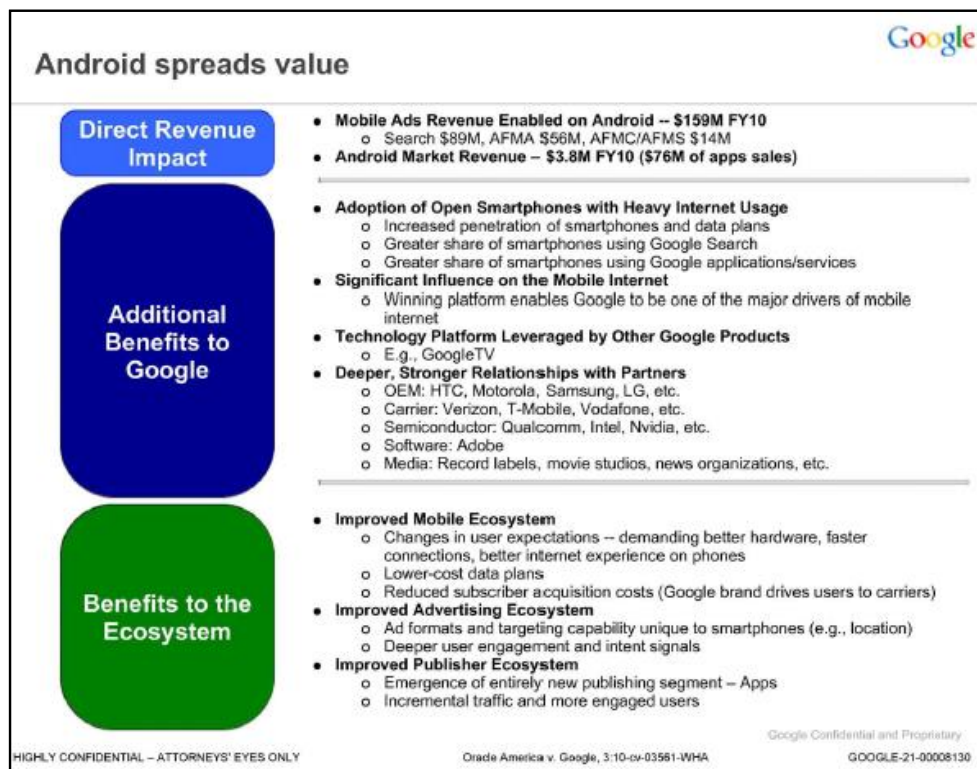
<sup>15</sup> Expert Report of Dr. Kemerer, February 8, 2016, ¶ 78.



seeking to break into the market. Without the carriers, Google would not have been able to launch a new platform. Google recognized this problem and spent many months making presentations to carriers and OEMs in which it touted the fact that Android would be Java-based. Google used this existing familiarity with Java to develop support during the critical development window in 2006 and 2007 while it put together the Open Handset Alliance. A summary of the presentations I have reviewed to date can be found in the Exhibits attached to my report.

26. In addition, the platform economics as described by Dr. Jaffe further underscores the great significance of the business circumstances faced by Google in 2006 when it made the “final” decision to build a Java-based system, as set out in my Initial Report. As explained by Dr. Jaffe, multi-sided platform markets like this one are very limited in their opportunities for success and depend upon critical gating actors who are beyond the control of the platform provider. In this matter, those gating actors were the OEMs and carriers.
27. This is exactly what Google contemplated when it created the Android Platform. Because Android was Java-based, it would be credible with OEMs and be adopted quickly. OEM adoption would create a multi-sided platform that Google controlled, permitting Google to derive revenue from mobile advertising and Google searches initiated from Android devices. As described in its strategy documents, Google considers advertising revenue to be part of the “Direct Revenue Impact” of the platform.

**Figure 2**  
**Google Strategy Document**





28. This is further confirmed by statements made by Eric Schmidt in earnings calls who stated that Android was “hugely profitable,”<sup>16</sup> and in interviews given by Andy Rubin who agreed that, because of Google’s advertising model, Android is profitable by itself even though Google does not charge for the Android product.<sup>17</sup>
29. Further, Dr. Leonard’s alleged counterfactual causal nexus approach suffers from numerous flaws, as discussed further below.

#### 4.2 Dr. Leonard’s Counterfactual Approach to Causation is Improper

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30. Dr. Leonard’s approach to determining the causal connection between the infringement and Google’s revenues and profits is unreliable. Dr. Leonard relies on an incomplete and unrealistic construction of a “counterfactual” world.<sup>18</sup> Dr. Leonard’s “counterfactual” approach to determining causation is explained in his report as follows:

*Speaking as an economist, the appropriate conceptual way to measure the causal effect of a factor on an outcome variable is to compare the difference in the outcome variable between the actual world and the counterfactual where the factor in question is altered exogenously from its actual value and the rest of the system is allowed to adjust.<sup>9</sup> In the case of an economic system, this means that the economic actors are allowed to reoptimize and choose new actions in the counterfactual.<sup>19</sup>*

31. I understand Dr. Leonard’s counterfactual approach to evaluating causation to be a “but-for” analysis which assesses the change in the market and the actions Google would have taken, had it not illegally used the Infringed Java Copyrights. While such “but-for” analyses have their place in assessing intellectual property damages, I do not believe that they are relevant to evaluating causation in connection with copyright infringement disgorgement of profits.
32. The relevant inquiry for copyright infringement disgorgement is the profits of the infringer attributable to the infringement, not cost savings or a speculative and unsupported counterfactual analysis that ignores important economic elements such as the dynamic and unpredictable nature of platform competition.<sup>20</sup>
33. My understanding from counsel is that the copyright disgorgement remedy is supposed to preclude the possibility that such a defendant benefits from the infringement. By permitting the infringer to

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<sup>16</sup> <http://www.morningstar.com/earnings/printtranscript.aspx?id=18282869>.

<sup>17</sup> <http://allthingsd.com/20101214/d-dive-into-mobile-the-full-interview-video-of-google-androids-andy-rubin/>.

<sup>18</sup> Expert Report of Professor Adam Jaffe, February 29, 2016, ¶ 19.

<sup>19</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 13.

<sup>20</sup> I understand from counsel that the reason for this is that copyright infringement typically results from intentional acts. Except in rare cases, infringers do not copy by accident—they know they are undertaking an act that involves reproducing the material of another. Unlike patents which might be infringed entirely by accident and without knowledge of any kind of an underlying right, copyright infringement generally occurs only when a defendant has knowingly copied something—even if that copying was not also a knowing infringement.



“reoptimize and choose new actions” the Court would be permitting Google to escape the consequences of its actions because of what it *might* have done, even though it did not in fact pursue that alternative approach. Such an approach improperly ends up allowing Google to retain profits that were in fact generated by the infringement in the real world.

34. Although Dr. Leonard “speaks as an economist” when explaining his counterfactual approach to copyright disgorgement causation, he cites to no case law, economic treatise or peer reviewed article to support his opinion that the application of this approach is appropriate.
35. I am not aware of any damages treatise or peer reviewed article that supports Dr. Leonard’s counterfactual approach to evaluating causation in connection with a copyright infringement disgorgement analysis. On that point, in connection with preparing this report, I reviewed each of the following texts in search of any such reference. I found none.
  - Litigation Services Handbook, The Role of the Financial Expert (Second Edition), Roman L. Weil, Michael J Wagner, Peter B. Frank (1995);
  - Litigation Services Handbook, The Role of the Financial Expert (Third Edition), Roman L. Weil, Michael J Wagner, Peter B. Frank (2001);
  - Economic Approaches to Intellectual Property, Dr. Gregory K. Leonard and Dr. Lauren J. Stiroch (2005);
  - Intellectual Property Valuation, Exploitation and Infringement Damages, Gordon v. Smith and Russell L. Parr (2005);
  - Economic Damages in Intellectual Property, Daniel Slottje (2006);
  - Litigation Services Handbook, The Role of the Financial Expert (Fifth Edition), Roman L. Weil, Daniel G. Lentz, David P. Hoffman (2012);
  - Assets and Finances: Calculating Intellectual Property Damages, Richard B. Troxel and William O. Kerr (2014);
36. In addition to reviewing the above texts, I have also reviewed the model jury instruction for the Ninth Circuit as it relates to the evaluation of causation in copyright matters and have found no reference to Dr. Leonard’s counterfactual approach.
37. Dr. Leonard also argues that I “agree” with him that a counterfactual world is a necessary consideration of the causal nexus in a disgorgement analysis because my Initial Report discusses commercially available noninfringing alternatives. This is incorrect. My Initial Report discusses the alternatives actually considered and rejected in the real world by Google, which strongly supports the notion that the Java APIs were a gating item to the Android Platform. This is not a discussion of a counterfactual world. It is a discussion of the real-world business limitations that were faced by Google at the time.
38. With this understanding in mind, I further address the flaws reflected in Dr. Leonard’s counterfactual analysis, as discussed in the paragraphs that follow.



39. The substantial amount of growth in the developer community, the increase in mobile data use, and the transformation of mobile handsets during Google's unique window of opportunity (none of which were considered by Dr. Leonard), make his attempt to construct a "but-for" (counterfactual) world highly speculative.<sup>21</sup>
40. Nowhere does Dr. Leonard explain how his non-existent "counterfactual" world would have arisen to exclude Java, despite the clear market circumstances at the time. As explained by Dr. Jaffe, it does not make sense to think that Apple would have achieved all of the market share because it was considered the high-end platform. There was room for another platform, as 80% of the market at that point was already using, and therefore familiar with, Java. Sun had already licensed Java SE for use in smartphones, and one of those phones was presented as the new device of the year at JavaOne in 2006.<sup>22</sup> Sun was also poised to offer additional SE-based smartphones in higher functioning devices either itself or through another licensee such as SavaJe. Dr. Leonard provides absolutely no support for how his counterfactual world would have developed without significant participation (and therefore earned revenues) by Java.
41. Dr. Leonard inappropriately uses an untested, unproven and unaccepted model to estimate the decrease in Android handset sales that would have occurred in a counterfactual world where there were fewer Android apps, as well as the percentage of the Android sales decrease that would have been captured by the iPhone. Dr. Leonard uses the model, which was developed for an entirely different purpose, to estimate the amount of ad revenue he asserts Google would have earned on those additional iPhone units and relies on that conclusion in connection with forming his opinions.<sup>23</sup> Dr. Leonard uses little, if any, evidence produced in this case to perform this analysis. Instead, he applies theoretical formulas to third party data which is disconnected from the evidence produced in this matter.
42. Dr. Leonard also inappropriately provides an alternate lost profits opinion in which iPhone is granted a larger portion of the "but-for" market based on a diversion ratio resulting from the counterfactual analysis. However, that analysis is flawed for the same reason. Dr. Leonard applies a model that was developed for a different purpose under a different set of assumptions about the smartphone market. I address each of the following points in response to Dr. Leonard's counterfactual approach and its application to his damages opinions:
  - Dr. Leonard's reliance on the Berry Model is improper
    - ✓ The Berry Model has limitations, according to Berry
    - ✓ Kim's application of the Berry Model makes it unreliable
  - Dr. Leonard's reliance on the Kim Model is also improper

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<sup>21</sup> Expert Report of Professor Adam Jaffe, February 29, 2016, ¶ 19-58.

<sup>22</sup> <http://news.softpedia.com/news/Jasper-S20-Java-Powered-Mobile-Phone-23841.shtml>.

<sup>23</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 90.



- ✓ The smartphone share calculation is unreliable
- ✓ The app share calculation is unreliable
- ✓ Kim's "but for" model neglects consideration of market participants<sup>24</sup>
- ✓ The Kim Model ignores significant aspects of the counterfactual world

#### 4.3 Dr. Leonard Improperly Applies the Berry Model

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43. Dr. Leonard performs calculations based on a 1994 Berry article entitled "Estimating Discrete-Choice Models of Product Differentiation" which proposes "estimation by 'inverting' the market-share equation to find the implied mean levels of utility for each good".<sup>25</sup>

*This article considers the problem of estimating supply and demand models in markets with product differentiation. In common with some previous articles, market demand is derived from a general class of discrete choice models of consumer behavior. The utility of consumers depends on product characteristics and individual taste parameters; product-level market shares are then derived as the aggregate outcome of consumer decisions. Firms are modelled as price-setting oligopolists, and endogenous market outcomes are derived from an assumption of Nash equilibrium prices.*<sup>26</sup>

##### 4.3.1 The Berry Model Has Limitations, According to Berry

44. Even the 1994 Berry Inversion paper which Dr. Leonard relies on describes inherent limitations with the approach, rendering it inapplicable in this matter.<sup>27</sup> For example, "I should emphasize in closing that the techniques of this article rely on a number of restrictive assumptions. These include assumptions that demand is well approximated by a static discrete-choice model and that the distribution of consumer tastes is known up to a parameter vector. More importantly, and more difficult to solve, I assume that product characteristics are economically exogenous."<sup>28</sup> Additionally, the paper states: "Also, in practice, the number of product characteristics that are important to consumers may be much larger than the number of observations available to the econometrician, making it impossible to estimate the separate effects of each characteristic."<sup>29</sup>

##### 4.3.2 Dr. Leonard's Application of the Berry Model is Unreliable

45. Dr. Leonard's application of the Berry inversion is not a peer accepted model amongst damages experts. I understand "discrete choice models" model choices consumers make between a set of alternatives.<sup>30</sup> Google's ability to enter the mobile handset market and gain unexpected success

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<sup>24</sup> Although Blackberry is also considered in Dr. Leonard's calculations, this alone does not account for the unknown nature of what other players would have played a material role in the but-for market.

<sup>25</sup> "Estimating discrete-choice models of product differentiation," Steven T. Berry, 1994.

<sup>26</sup> "Estimating discrete-choice models of product differentiation," Steven T. Berry, 1994.

<sup>27</sup> "Estimating discrete-choice models of product differentiation," Steven T. Berry, 1994.

<sup>28</sup> "Estimating discrete-choice models of product differentiation," Steven T. Berry, 1994.

<sup>29</sup> "Estimating discrete-choice models of product differentiation," Steven T. Berry, 1994.

<sup>30</sup> "Estimating discrete-choice models of product differentiation," Steven T. Berry, 1994.



provides evidence of the unique opportunity window that existed at that time. Additionally, the model ignores the possibility of the introduction of a successful smartphone operating system by any other market participant.

46. I understand that utility in the economic sense represents the amount of satisfaction of consuming a good or service. Dr. Leonard ignores the fact that different types of consumers choose the iPhone, as compared to an Android device, as well as the fact that consumer preference may have differed in the market absent Android.
47. Even as to consumers, mobile handset demand is not based entirely on apps alone; there are other features that contribute to consumer demand for a mobile handset, as Dr. Leonard notes throughout his report. Also, not all users value apps the same, as the Kim Model states: “iPhone users receive higher utility from an app of same quality than Android users do, which may be because iPhone users are more likely to love apps in general than Android users”.<sup>31</sup>
48. For at least these reasons, Dr. Leonard’s use of the Berry Model is not an accepted method for the determination of damages or a “but-for” estimation of the non-infringing market and, as such, it should be rejected in its entirety. These flaws are only compounded by Dr. Leonard’s use of the Kim Model.

#### 4.4 Dr. Leonard’s Application of the Kim Model is Improper

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49. Dr. Leonard relies on an empirical economic model of smartphone demand developed by Min Jung Kim, an economics doctoral candidate from the University of Minnesota, to arrive at the diversion ratio in conjunction with the Berry Model.<sup>32</sup> The “Kim Model” is a dissertation thesis written by a PhD candidate that, to my knowledge, was not published in any peer-reviewed journals and has not been accepted by the courts as an appropriate damages methodology. Dr. Leonard errs in relying on an empirical model that has not been peer-reviewed or accepted for a determination of damages.
50. The inputs used by Dr. Leonard in the Kim Model are also unreliable. Dr. Leonard describes the share calculations as follows:<sup>33</sup>
  - **Smartphone Share:** The share of a smartphone OS in a given month - defined as the U.S. unit handset sales in that month divided by the U.S. population over the age of ten.
  - **App Share:** An app’s market share - defined as the number of downloads of the app in a given month divided by the handset sales of the OS in that month.

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<sup>31</sup> “Essays on the Economics of the Smartphone and Application Industry,” Min Jung Kim, 2013, p. 41.

<sup>32</sup> “Essays on the Economics of the Smartphone and Application Industry,” Min Jung Kim, 2013.

<sup>33</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 92.



Dr. Leonard's report and exhibits do not show his calculations of these shares or how he relies on the results of these two calculations to ultimately arrive at his recapture percentages or diversion ratio. Despite exclusion of his calculations, I address the flaws in his descriptions of these inputs.

#### **4.4.1 The Smartphone Share Calculation is Unreliable**

51. Dr. Leonard's calculation of smartphone share is based on U.S. handset sales and the entire U.S. population over ten. This basis assumes every person in the U.S. over the age of ten owns a mobile handset. While a growing portion of the population owns a mobile handset, this spreads each smartphone OS across too broad of a population and thus the results are likely to be inaccurate. As a point of reference, 35% of the adult U.S. population owned a smartphone in 2011 and 68% in 2015.<sup>34</sup>
52. These variables and inputs appear arbitrary, as the relevance of the number of people over the age of ten to total U.S. handset sales is unclear. There is no evidentiary support for assuming that all people over the age of ten in the U.S. have handsets or even represent a meaningful population relevant to this case. The Kim Model reveals a difference in handset use between different age groups stating: "richer and younger consumers prefer the iPhone over Android phones, and at the same time, they tend to like apps more".<sup>35</sup> Furthermore, focusing on only the U.S. handset market inappropriately portrays the worldwide market and ultimately applies a U.S. based analysis to worldwide revenues. In support of the differences between the U.S. and worldwide markets, the Kim Model states that the U.S. accounts for roughly 30% of global app downloads.<sup>36</sup>

#### **4.4.2 The App Share Calculation is Unreliable**

53. Dr. Leonard improperly uses a calculation of the app share, or app utility to a smartphone user, as a variable in his counterfactual analysis. To determine which apps to use in this analysis, Dr. Leonard relied on the top paid and free app lists from AppAnnie data from January 2012 to December 2015.<sup>37</sup> According to Dr. Leonard's use of the model, any app in the following categories is assumed to be available on Android in the counterfactual, but apps in none of these categories are assumed to be unavailable in the counterfactual:
  - It is a Google App;
  - It was written using the NDK;
  - It was multi-homed on iOS;
  - Its developer also developed apps for iOS;

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<sup>34</sup> <http://www.pewinternet.org/2015/10/29/the-demographics-of-device-ownership/>.

<sup>35</sup> "Essays on the Economics of the Smartphone and Application Industry," Min Jung Kim, 2013, p. 27.

<sup>36</sup> "Essays on the Economics of the Smartphone and Application Industry," Min Jung Kim, 2013, p. 2.

<sup>37</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 92.



- Its developer also developed NDK Android apps.<sup>38</sup>
54. Dr. Leonard's counterfactual analysis improperly only considers apps downloaded in the first month of owning a smartphone. The Kim Model acknowledges the limitations of this assumption: "apps that are already installed on the device upon purchase (factory-installed apps) may also create non-negligible economic value but they are not considered in the paper due to lack of data". Additionally, "one limitation of the study is that the possibility of different utilization of each app (e.g., depending on price and category) is ignored".<sup>39</sup>
55. Lastly, in his applications of the counterfactual results, Dr. Leonard inappropriately uses 2012 as a proxy for all prior years. I understand that prior to 2012 there were fewer apps available on the market.<sup>40</sup> Since the number of apps was rapidly changing over the relevant period, Dr. Leonard's assumption that the 2012 share would be the same in prior years is also flawed. Additionally, the Kim Model indicates limitations with this assumption: "consumers who purchase smartphones earlier in time or choose a smartphone with a better app system are already predisposed to purchasing apps."<sup>41</sup>
56. Despite these core flaws rendering the Kim Model unreliable for Dr. Leonard's purpose, Dr. Leonard uses these smartphone and app shares in a series of ill-described calculations that are based on a number of flawed or undisclosed assumptions to purportedly calculate the:
- The decrease in Android's sales; and
  - The increase in iPhone sales in the counterfactual relative to their actual levels.<sup>42</sup>
- He then takes the weighted averages to calculate (again in an unclear way) by year:
- The percentage Android sales decrease in the counterfactual; and
  - The percentage of the Android sales decrease in the counterfactual that is captured by the iPhone (the "diversion ratio")<sup>43</sup>

#### **4.4.3 Use of the Kim and Berry Models to Determine a "But-For" World Neglects Consideration of Other Market Participants**

57. As part of Dr. Leonard's determination of the number of additional iPhone units that would have been sold in the counterfactual, he assumes "Apple would have had time to expand its supply of iPhones and, indeed, the capacity in the various component industries made available by the lower

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<sup>38</sup> Expert Report of Dr. Leonard, February 8, 2016, pp. 92-93.

<sup>39</sup> "Essays on the Economics of the Smartphone and Application Industry," Min Jung Kim, 2013, p. 16.

<sup>40</sup> Exhibits 1b, 3d.2, 3d.3, 4e, and 4f to the Expert Report of Dr. Leonard, February 8, 2016.

<sup>41</sup> "Essays on the Economics of the Smartphone and Application Industry," Min Jung Kim, 2013, p. 27.

<sup>42</sup> Expert Report of Dr. Leonard, February 8, 2016, pp. 93.

<sup>43</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 93.



Android handset sales could have been utilized by Apple.”<sup>44</sup> This is untrue as Apple has experienced numerous supply shortages when releasing its iPhone products.<sup>45</sup> In fact, it has suffered from supply shortages almost every time it has released an iPhone. Yet, Dr. Leonard’s analysis simply assumes away that real world fact.

58. This assumption also ignores other players in the market with access to those same resources. While Android sales may have dropped, Dr. Leonard’s model ignores that another entity with their own OS may have required the same resources in a “but for” Android world. Additionally, it suggests Apple’s closed environment would have monopolized the smartphone market which ignores the success that resulted from Android’s free open source model. Android was able to compete with Apple and, “but-for” Android, other parties could have competed as well.<sup>46</sup> There were already numerous other participants in the market, including Microsoft and Nokia with their own platforms, and numerous players selling Java-based devices. Indeed, without more detailed information related to Apple’s supply chain, it is unreasonable even to assume that Apple would have had the capacity to make all of the additional Android related sales.
59. Absent Android, which secured a number of critical relationships to gain its success, parties would have formed different relationships and continued to compete in the mobile handset market. Evidence indicates that a number of players in the market including Microsoft and Nokia, were making investments.<sup>47</sup> Carriers were pressuring OEMs to provide alternatives to iPhone since it was exclusively offered by AT&T.<sup>48</sup> Most of those OEMs and carriers (which changed over time as AT&T was no longer exclusive to iPhone) partnered with Android,<sup>49</sup> but to expect OEMs to do nothing to successfully compete with iPhone in the counterfactual world is inappropriate. Android’s success ceased much of the activity by competitors and became a barrier to entry. Guessing what would have occurred without its rapidly successful presence in the market requires too many assumptions for a reasonable damages opinion.<sup>50</sup>
60. Assuming Android would have existed without Google’s infringement is also speculative. It would have taken Google longer to get to market had it not used the Infringed Java Copyrights.<sup>51</sup> Given the unique window of opportunity in the mobile space at the time, a delay would have altered the market dynamics.

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<sup>44</sup> Footnote 286 to the Expert Report of Dr. Leonard, February 8, 2016, p. 93.

<sup>45</sup> <http://www.pcmag.com/article2/0,2817,2366762,00.asp>, <http://www.cnet.com/news/iphone-6s-plus-in-short-supply-due-to-production-issues-says-analyst/#!>; <http://www.zdnet.com/article/iphone-5s-reportedly-in-short-supply-for-fridays-launch/>.

<sup>46</sup> Expert Report of Professor Adam Jaffe, February 29, 2016, ¶¶20-41.

<sup>47</sup> OAGOOGL0002778854-882 at 855 and 869.

<sup>48</sup> OAGOOGL0000799926; <http://www.pcmag.com/article2/0,2817,2366762,00.asp>.

<sup>49</sup> OAGOOGL0000799926; OAGOOGL0000457616-617 at 617.

<sup>50</sup> I note that these issues are further discussed in the section of my report which responds to Dr. Leonard’s comments concerning my lost profit opinions.

<sup>51</sup> Expert Report of Professor Adam Jaffe, February 8, 2016, ¶¶196 and 199.



#### 4.4.4 The Kim Model Ignores Significant Aspects of the Counterfactual World

61. Without the market power from the success of Android, Google likely would have been in a much different bargaining position. While it is difficult to reconstruct a smartphone market absent Android, a few observations can be made as to the likely “but-for” world. First, it is likely that an alternative player in the market would have competed with iPhone.<sup>52</sup> It is also likely that Google’s profitability would have suffered absent the market power resulting from Android’s success, because Google would have faced greater competition for access to mobile apps, advertising, and browser traffic. Absent Android, Google would likely have been much less relevant to the mobile handset industry since it would not directly participate. The concern of exactly this circumstance developing is what drove Google to copy the Java APIs without permission rather than develop its own. Thus, implying Google would have earned additional revenue on improperly determined additional iPhone units does not consider how Google’s weakened bargaining position would have impacted its relationship with Apple.
62. Based on the above, Dr. Leonard’s counterfactual model is unreliable for use in a damage calculation. It admittedly does not take into account a myriad of alternatives and factors that clearly would have impacted the smartphone market “but for” Android’s use of the Infringed Java Copyrights. These limitations of Dr. Leonard’s counterfactual model render the results irrelevant to the determination of damages in this case.

#### 4.5 Dr. Leonard’s Analyses of the Profit Google Realized from Android Are Defective

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63. Dr. Leonard’s quantification of the profits Google realized through the development and commercialization of the Android operating system (as reflected in Leonard Exhibits 1a.1 and 1a.4) are both defective and unreliable for at least the reasons set forth below.

##### 4.5.1 Dr. Leonard Substantially Understates “Android-Related Profits” (Leonard Ex. 1a.1)

64. Dr. Leonard’s “top-down” “Android-Related Profits” analysis begins in Leonard Exhibit 1a.1 and continues to Leonard Exhibit 3e. It results in “Android-Related Profit” of \$14.2 billion and “Android-Related Profit (Apportioned to the 37 APIs)” of \$56.3 million. Dr. Leonard’s calculation of “Android Related Profits” is similar to the summary of Google’s reported Android operating results in Revised Exhibit 7 attached hereto. In fact, only the following three cost/expense line items are different: 1) Traffic Acquisition Costs (a cost of sale), 2) “Android General and Administrative Expense” (an operating expense), and 3) “Incremental Search and Advertising Expense” (an operating expense). Each of these line items is discussed below:

##### 4.5.2 Dr. Leonard Effectively Double-Counts Search Traffic Acquisition Costs (TAC)

65. In Leonard Exhibit 1a.1, Dr. Leonard quantified Android-related TAC of \$8.1 billion for the eight-year period 2008 to 2015. This amount is substantially overstated. As reflected in Revised Exhibit

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<sup>52</sup> Expert Report of Professor Adam Jaffe, February 29, 2016, ¶ 16.



7 attached hereto, my calculation of Android TAC for the same eight-year time period totals \$6.3 billion.

66. Dr. Leonard calculates 2011 to 2015 Android TAC in Leonard Exhibit 1d. In that Exhibit, Dr. Leonard utilizes total annual AdWords, AdSense and Display Revenue and TAC for “Google as a whole”<sup>53</sup> to estimate Android-related TAC. Annual AdWords (i.e., Search) TAC in Leonard Exhibit 1d<sup>54</sup> compares closely to the annual TAC payments to “Non-Android Mobile Operating System Partners,”<sup>55</sup> as reported in the Google record at Docket No. 1436 of this matter. Annual AdWords TAC in Leonard Exhibit 1d also compares closely to the annual “TAC Paid to Distribution Partners,” figure Google reported in its Forms 10-K.<sup>56</sup> The Figure below provides a summary of Google’s reported: 1) TAC for AdWords;<sup>57</sup> 2) TAC paid to “Non-Android Mobile O.S. Partners,”<sup>58</sup> and 3) TAC “Paid to Distribution Partners,”<sup>59</sup> for the years 2011 to 2014.

**Figure 3<sup>60</sup>**

**Comparative Analysis: AdWords TAC v. TAC Paid to Distribution Partners**

Source of Data	2011	2012	2013	2014
Google Total AdWords TAC	\$1,332.7	\$1,864.5	\$2,638.1	████████
TAC Paid to "Non-Android Mobile O.S. Partners"	████████	████████	████████	████████
Google Total "TAC Paid to Distribution Partners"	\$1,517.0	\$2,165.0	\$2,965.0	\$3,633.0

67. As the above Figure illustrates, the annual AdWords TAC figure utilized by Dr. Leonard represents nearly ██████████ of the total annual TAC paid to “Non-Android Mobile O.S. Partners,” as reported to this Court in Docket No. 1436, and nearly ██████████ of the total annual “TAC Paid to Distribution Partners,” as Google reported in its Forms 10-K. Based on my review of the record evidence, I conclude that the annual AdWords TAC figures are captured in and are a part of “Non-Android Mobile O.S. Partners” and “TAC Paid to Distribution Partners.” Stated differently, all three of these cost descriptions capture the same AdWords-related TAC paid to Non-Android

<sup>53</sup> See Email from Daniel Purcell to Annette Hurst, November 8, 2015.

<sup>54</sup> GOOG-00022380; for “Google as a whole.” See Email from Daniel Purcell to Annette Hurst, November 8, 2015.

<sup>55</sup> See Exhibit 14; Case No. CV 10-03561 WHA, Docket No. 1436; “Google Search Distribution Agreements with Non-Android Mobile Operating System Partners.”

<sup>56</sup> Google 2013 Form 10-K, p. 31; Google 2014 Form 10-K, p. 26.

<sup>57</sup> GOOG-00022380; for “Google as a whole.” See Email from Daniel Purcell to Annette Hurst, November 8, 2015.

<sup>58</sup> See Exhibit 14; Case No. CV 10-03561 WHA, Docket No. 1436; “Google Search Distribution Agreements with Non-Android Mobile Operating System Partners.”

<sup>59</sup> Google 2013 Form 10-K, p. 31; Google 2014 Form 10-K, p. 26.

<sup>60</sup> See Exhibit 14.



Distribution Partners. That is: all three costs descriptions represent the same dollars paid to Non-Android Distribution Partners.

68. As indicated in my Initial Report, the Android-related Distribution Partners to which Google pays TAC are primarily wireless carriers. Google developed and commercialized the Android operating system to, among other things, avoid paying TAC to other mobile platforms to direct Internet traffic to Google websites. As discussed in my Initial Report, the Android-related TAC Google pays to wireless carriers is captured and accounted for in Android Profit and Loss Statements as Apps and Digital Content Cost of Sales.<sup>61</sup>
69. According to Dr. Leonard, “Apps COS includes payments for developers, credit card fees and payments to carriers,”<sup>62</sup> and “Digital Content COS . . . include payments to carriers, credit card companies and content owners, such as publishers.”<sup>63</sup> A May 2015 Google presentation entitled “Introduction to Android” indicates that Google expected to pay approximately \$1.8+ billion of TAC in 2015 to its Android carrier Distribution Partners, OEMs, and Retail Partners through revenue-sharing agreements, channel incentives, and rent.<sup>64</sup> To the extent Google actually incurred these costs, they are captured in Revised Exhibit 7 as App Cost of Sales, Digital Content Cost of Sales, and likely Sales Expense and Marketing Expense.<sup>65</sup>
70. According to Mr. Jonathan Gold:
- Q. What are the carriers being paid for?*
- A. The bulk of this is Google Play rev share for the payment processing, and then there’s a portion of it that is related to traffic acquisition costs for Google.com when carriers choose to set Google as the default search.*
- Q. And what are the OEMs being paid for?*
- A. Similar things. . . But largely that is for Google.com rev share.*
- Q. And what are the retailers being paid for?*
- A. This is almost entirely rent in the cases of selling things from Chromecast to trying to encourage third-party devices to be sold.<sup>66</sup>*
71. Because the TAC that Google pays its Android Distribution Partners is accounted for in the Android Profit and Loss Statements summarized in Revised Exhibit 7, primarily as Apps and Digital Content Cost of Sales, Dr. Leonard’s inclusion of AdWords TAC (alternatively described as “TAC Paid to “Non-Android Mobile O.S. Partners”) in his calculation of Android-related TAC

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<sup>61</sup> My Initial Report, pp. 119-120.

<sup>62</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 22.

<sup>63</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 22.

<sup>64</sup> GOOG-00130338-386 at 340.

<sup>65</sup> Revised Exhibit 7.

<sup>66</sup> Deposition of Jonathan Gold, December 11, 2015, p. 185-186.



substantially overstates Android-related TAC. Thus, Dr. Leonard's calculation of Android-Related Profits in Leonard Exhibit 1a.1 is defective and unreliable.

72. My Android-Network-Member-related TAC calculation in Revised Exhibit 7.1 properly quantifies only the Google-Network-Member portion of annual TAC related to AdSense and Display that is not already accounted for in the Android Profit and Loss Statements reported by Google. Thus, my quantification of Android-related TAC accurately estimates the annual amounts of TAC incurred by Google.

#### **4.5.3 General & Administration Allocation is Improper and Contrary to the Record Evidence**

73. Dr. Leonard improperly deducts "Android General and Administrative" expenses of \$1.5 billion in his "Android-Related Profits" calculation reflected in Leonard Exhibit 1a.1.<sup>67</sup> This deduction results in an understatement of "Android-Related Profits."
74. As indicated in my Initial Report,<sup>68</sup> during the relevant time period, Google regularly reported the profits it earned from the Android Platform to its Android Operating Committee, as well as to other Google executives. As set forth in my Initial Report, Google's contemporaneous business and financial records consistently identify the same cost of sales and operating expense line items as deductions from Android-related revenues in reporting Android-related profit.<sup>69</sup>
75. The Profit and Loss Statements contained within these contemporaneously-prepared business records, in addition to other data, provide a basis for quantifying the costs and expenses that actually helped generate the revenues I have determined are causally connected to the Infringed Java Copyrights.<sup>70</sup> Revised Exhibit 7 is a summary of Android-related annual operating results as reflected in many of these contemporaneous business records.
76. Google retained Dr. Alan Cox in connection with the 2012 trial for this matter. On October 3, 2011, Dr. Cox issued the Expert Report of Dr. Alan J. Cox ("the Cox Report") which included a summary of "Profit and Loss Statements of the Android Platform" for the period January 2008 to September 2011 at Cox Exhibit 3b. The Figure below is an image of Cox Exhibit 3b which reflects all of the revenues (including, notably, "Android Gross Ad Revenues"), cost of sales, and operating expenses that Dr. Cox attributed to the Android platform as of September 2011. As the

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<sup>67</sup> Expert Report of Dr. Leonard, February 8, 2016, Exhibit 1a.1.

<sup>68</sup> My Initial Report, Paragraph 295.

<sup>69</sup> See, for example: GOOGLE-00303725 – 756 at 739; GOOGLE-01-00053552 – 591 at 556; GOOGLE-77-00053555 – 575 at 562; GOOG-00103813; GOOG-00100278 – 301 at 301; GOOG-00100391 – 408 at 401; GOOG-00104442 – 480 at 446; GOOG-00130338 – 386 at 342; GOOG-00131217 – 253 at 226; GOOG-00131428 – 461 at 452 and 456; GOOG-00132245 – 266 at 265; GOOG-00132508 – 534 at 518 and 532; GOOG-00132955 – 984 at 979; GOOG-00133825 – 856 at 851; GOOG-00186863 – 873 at 865; GOOG-00272276 – 298 at 286; GOOG-00272299 – 321 at 308; GOOG-00277550 – 585 at 559.

<sup>70</sup> Order Re Willfulness and Bifurcation, *Oracle America Inc. v. Google Inc.*, No. C 10-03561, September 18, 2015, p. 6-8.



following Figure illustrates, Dr. Cox did not allocate General and Administrative expenses to the Android platform.

**Figure 4**  
**Exhibit 3b to the October 3, 2011 Expert Report of Alan Cox**

Line Item	2008	2009	2010	2011
	(Millions of U.S. Dollars)			
	(1)	(2)	(3)	(4)
<b>Revenue<sup>1</sup></b>				
Android Gross Ad Revenues	\$ 0.68	\$ 15.71	\$ 140.43	\$ 387.51
Nexus Phone (DTC) Revenues	-	-	115.18	-
Android Market Revenues	0.02	1.10	8.03	22.13
<b>Total</b>	<b>\$ 0.7</b>	<b>\$ 16.8</b>	<b>\$ 263.6</b>	<b>\$ 409.6</b>
<b>Cost of Sales<sup>1</sup></b>				
TAC <sup>2</sup>	\$ 0.2	\$ 2.9	\$ 53.5	\$ 124.0
Operations	0.2	0.5	4.3	15.6
COS (incl. DTC)	0.0	0.3	109.9	9.9
<b>Total</b>	<b>\$ 0.4</b>	<b>\$ 3.7</b>	<b>\$ 167.7</b>	<b>\$ 149.5</b>
<b>Operating Expenses<sup>1</sup></b>				
Sales Expenses	\$ 0.9	\$ 3.2	\$ 5.2	\$ 6.6
Marketing <sup>3</sup>	12.3	16.6	53.3	44.3
Product Management ("PM")	0.0	1.9	8.0	1.1
<b>Total</b>	<b>\$ 13.20</b>	<b>\$ 21.71</b>	<b>\$ 66.45</b>	<b>\$ 51.92</b>
Engineering Expenses <sup>1</sup>	\$ 86.3	\$ 41.2	\$ 99.7	\$ 129.5
Amortized Cost of Engineering Expenses <sup>4</sup>	11.9	29.5	48.9	80.5
<b>Legal Expenses</b>	<b>\$ 1.0</b>	<b>\$ 2.1</b>	<b>\$ 32.2</b>	<b>\$ 75.8</b>

77. The General and Administrative expenses which Dr. Leonard allocates to the Android platform concern Google's finance and accounting, human resources, and real estate functions.<sup>71</sup> Dr. Leonard allocates these expenses based on the number of Android engineers as a percentage of the total number of Google engineers.<sup>72</sup> Dr. Leonard offers no economic, statistical, or other quantitative or qualitative analysis in support of the use of this metric as an allocation basis. To the contrary, Dr. Leonard cites primarily to "Conversations with Jonathan Gold" in support of his conclusions regarding the nature of and rationale for allocating these expenses. Without supporting quantitative or qualitative analysis, Dr. Leonard's allocation methodology is unreliable.
78. I understand that the Court has indicated that overhead expenses should be deducted "only when the infringer can demonstrate it was of actual assistance in the production, distribution or sale of the infringing product."<sup>73</sup> Dr. Leonard has not demonstrated that these General and Administrative expenses actually assisted in any of these corporate functions.

<sup>71</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 25.

<sup>72</sup> Expert Report of Dr. Leonard, February 8, 2016, Exhibit 1e.

<sup>73</sup> Order Re Willfulness and Bifurcation, 3:10-cv-03561, Docket No. 1321, September 18, 2015, p. 10.



79. Given, among other things, the opinion of Google's previous expert, the nature of the allocated General and Administrative expenses, the Court's prior orders, and the contemporaneously-reported operating results for the Android platform which do not reflect \$1.5 billion of General and Administrative expenses,<sup>74</sup> Dr. Leonard's allocation of these expenses to the Android platform is improper, and results in the understatement of his "Android-Related Profits."

#### 4.5.4 "Incremental" Search and Advertising Expenses Do Not Relate to Android

80. Dr. Leonard improperly deducts "Incremental Search and Advertising" expenses totaling \$2.4 billion in his calculation of "Android-Related Profits" as reflected in Leonard Exhibit 1a.1.<sup>75</sup> The deduction of these "Incremental Expenses" from Android revenues results in the understatement of Dr. Leonard's "Android-Related Profits."
81. Like the "Android General and Administrative" expenses discussed above, these "Incremental Search and Advertising Expenses" are not reflected in the contemporaneously prepared Profit and Loss Statements, as summarized in Revised Exhibit 7.
82. Like the "Android General and Administrative" expenses discussed above, the "Incremental Search and Advertising Expense" is also not reflected in Cox Exhibit 3b, as reflected in the above Figure. And, as discussed previously, I believe Dr. Leonard's inclusion of these costs is an improper attempt to offset the significant amount of Android related profit Google has generated since 2011, when Dr. Cox issued his initial report.
83. Furthermore, Dr. Leonard's own analyses undermine his conclusion that these "Search and Advertising Expenses" were incurred in connection with the Android platform. For example, in Exhibit 1b – iPhone Recapture Adjustment – Dr. Leonard subtracts these same "Incremental Search and Advertising Expenses" of \$2.4 billion to derive an "iPhone Recapture Adjustment" of \$6.5 billion. In doing so, Dr. Leonard implies that these expenses would have been incurred by Google regardless of whether the Android platform was developed and commercialized.
84. Likewise, in Leonard Exhibit 1a.4, Dr. Leonard excludes these expenses in his calculation of "Profit Apportioned to Android Versus Search/Ads Technologies and Services." In doing so, Dr. Leonard again implicitly concedes that none of these "incremental" expenses are actually attributed to Android, and that these expenses, in fact, relate only to Google's "Search/Ads Technologies and Services." If Dr. Leonard's ultimate opinion was that any portion of these "Incremental Search and Advertising Expenses" were actually incurred in connection with the Android platform, then some portion of these expenses would be reflected in this calculation.
85. Given, among other things, the opinions of Google's other experts, Dr. Leonard's own analyses, and the contemporaneously-reported operating results for the Android platform which do not

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<sup>74</sup> As summarized on Exhibit 7 to my Initial Report.

<sup>75</sup> Expert Report of Dr. Leonard, February 8, 2016, Exhibit 1a.1.



reflect \$2.4 billion of “Incremental Search and Advertising Expenses,”<sup>76</sup> Dr. Leonard’s inclusion of these expenses in his calculation of “Android-Related Profits” is improper and results in an understatement of Google’s “Android-Related Profits.”

#### **4.5.5 Dr. Leonard’s “iPhone Recapture Adjustment” is Defective**

86. According to Dr. Leonard, “I determined that Google would recapture at least 44% of its ad revenue on Android handsets with ad revenue on iPhones.”<sup>77</sup> In connection with offering that opinion, in Leonard Exhibit 1b, Dr. Leonard calculates that Google would have recaptured \$6.5 billion of profit from Ad Revenue “in the absence of Android.”<sup>78</sup> Dr. Leonard’s “iPhone Recapture Adjustment” is defective for several reasons, including at least the following.

##### **4.5.5.1 Dr. Leonard Failed to Sufficiently Account for Differences in Price**

87. According to Dr. Leonard, “[a]s a result of OEM’s product development efforts and the competition between OEMs promoted by Android, the prices of Android devices have decreased substantially over time, while their quality has improved dramatically. For example, between 2010 and 2015, the quality-adjusted contract price for an Android handset decreased from \$213 to \$14 . . .”<sup>79</sup> Leonard Exhibit 2a indicates that the per-unit Android contract price declined from \$213 as of Q1 2010, to \$88 as of Q4 2015.<sup>80</sup>
88. Unlike Android prices, the prices of iPhones have remained relatively high. The Figure below illustrates annual iPhone prices, annual Android prices, and the pricing difference for the five-year period 2010 to 2014. As the Figure illustrates, iPhone prices ranged from a low of \$650 to a high of \$710, while Android smartphone prices declined from \$441 to \$254 during this time period.<sup>81</sup>

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<sup>76</sup> As summarized on Exhibit 7 to my Initial Report.

<sup>77</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 27.

<sup>78</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 27 and Exhibit 1b.

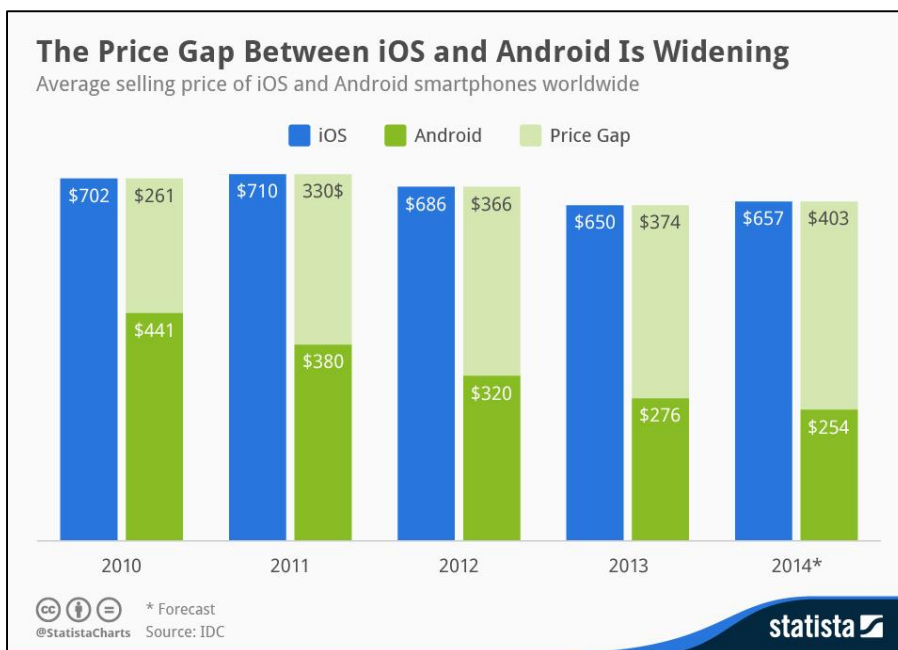
<sup>79</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 44.

<sup>80</sup> Expert Report of Dr. Leonard, February 8, 2016, Exhibit 2a.

<sup>81</sup> The Price Gap Between iOS and Android is Widening, Statista, Felix Richter, June 1, 2014; <https://www.statista.com/chart/1903/average-selling-price-of-android-and-ios-smartphones/>



**Figure 5**  
**Average Annual iPhone and Android Smartphone Prices – 2010 to 2014<sup>82</sup>**



89. Nowhere in the Leonard Report does Dr. Leonard discuss or evaluate the \$261 to \$403 price difference between iPhones and Android smartphones, or how this significant difference impacts his conclusion that 41 to 44 percent of Android Ad Revenue would have been “diverted” to users of iPhones during the eight-year period 2008 to 2015.<sup>83</sup> Without such an analysis, Dr. Leonard’s conclusions lack merit.

#### **4.5.5.2 Dr. Leonard Fails to Provide Substantiating Analysis for Diversion Percentages**

90. Leonard Exhibit 1b – iPhone Recapture Adjustment – utilizes annual “Diversion Ratios” of 40.5 to 44.0 percent to derive an “iPhone Recapture Adjustment” of \$6.5 billion. According to Dr. Leonard, “[b]ased on an analysis discussed below, I determined that Google would recapture at least 44% of its ad revenue on Android handsets with ad revenue on iPhones. Applying this recapture rate to Android ad revenue yields the incremental ad revenue that Google would have made on the iPhone in the absence of Android.”<sup>84</sup> Notes to Leonard Exhibit 1b refer to Leonard 3d.2 “[f]or the diversion ratio.”

<sup>82</sup> The Price Gap Between iOS and Android is Widening, Statista, Felix Richter, June 1, 2014;  
<https://www.statista.com/chart/1903/average-selling-price-of-android-and-ios-smartphones/>

<sup>83</sup> Expert Report of Dr. Leonard, February 8, 2016, Exhibit 1b.

<sup>84</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 27.



91. Nowhere else in the Leonard Report does Dr. Leonard analyze, evaluate, or discuss how the “diversion ratios” of 41 percent to 44 percent are derived. Without such an analysis and discussion, Dr. Leonard’s opinions and conclusions are unsubstantiated and therefore unreliable.<sup>85</sup>

#### **4.5.6 Dr. Leonard Substantially Understates “Android Profits” (see Leonard Ex. 1a.4)**

92. Dr. Leonard’s “top-down” “Android Profits” approach begins in Leonard Exhibit 1a.4 – Profit Apportioned to Android Versus Search/Ads Technologies and Services – and continues to Leonard 3e – Top Down Apportionment. This approach results in “Android Profit” of \$1.9 billion, and “Android Profit (Apportioned to the 37 APIs)” of \$32.4 million.<sup>86</sup> Dr. Leonard’s “top-down” “Android Profits” approach is defective for several reasons including at least the following.

##### **4.5.6.1 Dr. Leonard’s 32 Percent TAC Savings Factor is Too Low**

93. As illustrated in Leonard Exhibit 1a.4, Dr. Leonard utilized a cost-based metric of [REDACTED] to quantify the portion of Android Search Ad Revenue that Dr. Leonard asserts is attributable to the Android platform. The [REDACTED] figure is derived from financial data reflected in a May 2015 Google presentation entitled “Introduction to Android.”<sup>87</sup> Based on that financial information, Dr. Leonard concludes that Google earns [REDACTED] less profit for Search Ad Revenue generated from iPhones than it does from Search Ad Revenue generated from Android devices.<sup>88</sup>
94. Dr. Leonard’s [REDACTED] figure is based on the difference between an imputed Search Ad Revenue-per-Android-unit figure of [REDACTED], and an imputed net margin from Search Ad Revenue-per-iPhone figure of [REDACTED]. The May 2015 Google presentation attributes the difference to the TAC Google pays to Apple Inc. to direct Internet traffic from iPhones and iPads to Google websites.<sup>89</sup> Dr. Leonard’s [REDACTED] TAC savings factor is too low.
95. On January 20, 2016, this Court entered an Order Re: Motion to Compel,<sup>90</sup> whereby Google was ordered to produce “charts specifying the following data for each provider of a non-Android mobile operating system with whom Google has or previously had a search distribution agreement for Google search services offered in connection with such non-Android mobile operating system, where such agreement also provided for the sharing of revenue.”<sup>91</sup>
96. In response to that Order, Google produced a document entitled “Google Search Distribution Agreements with Non-Android Mobile Operating System Partners” (“Google’s Non-Android

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<sup>85</sup> Dr. Leonard’s iPhone Recapture Adjustment set forth in Leonard Exhibit 1b also suffers from some of the same defects I addressed above. Namely, Android-related TAC of \$8.1 billion is too high, and the “Incremental Search and Advertising Expenses” are improperly allocated to the Android platform.

<sup>86</sup> Expert Report of Dr. Leonard, February 8, 2016, Exhibit 3e.

<sup>87</sup> GOOG-00130338-386 at 343.

<sup>88</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 33; [REDACTED]

<sup>89</sup> GOOG-00130338-386 at 343.

<sup>90</sup> Order Re: Motion to Compel, 3:10-cv-03561-WHA, Docket No. 1436, January 20, 2016, p. 2.

<sup>91</sup> Order Re: Motion to Compel, 3:10-cv-03561-WHA, Docket No. 1436, January 20, 2016, p. 1.



Mobile O.S. Partner List”). For six Google non-Android Mobile O.S. Partners, this document provides: 1) the percentage of Search Revenue Google shares with the partner; 2) the total gross revenue earned by Google under the agreement; and 3) the Google search services which are the subject of the respective agreements.

97. Exhibit 7.6 is a calculation of the weighted average percent of Search Revenue Google shares with all six Partners reflected in Google’s Non-Android Mobile O.S. Partner List. As Exhibit 7.6 illustrates, since 2006, Google has paid back to its non-Android Mobile Operating System Partners 35.6 percent of the Search/Ad Revenue it earns from non-Android mobile devices of those partners.
98. Given the availability of the information in Google’s Non-Android Mobile O.S. Partner List, it is curious that Dr. Leonard chose to rely only on imputed profit margin figures reflected in one Google presentation that compares the annual profitability of Android devices to only iPhones as of a certain point in time (2015). In any event, the [REDACTED] factor derived by Dr. Leonard is about [REDACTED] points lower than the average TAC percentages of Search Ad Revenue Google paid to non-Android Mobile O.S. Partners during the relevant time period.
99. Dr. Leonard’s application of his imputed [REDACTED] TAC savings to the \$19.3 billion of Search Revenue Google earned from Android devices during the years 2008 to 2015 results in the understatement of the Android Search Ad Revenue attributable to the Android platform.

#### **4.5.6.2 Google Would Not Have Realized 100% of AdSense/Display Revenue Absent Android**

100. AdSense and Display revenues are generated from Android devices. However, Leonard Exhibit 1a.4 excludes revenue, TAC, and profit for the AdSense and Display Ad Revenue Google realized from Android devices. Presumably, it is Dr. Leonard’s position that no AdSense or Display revenue, TAC or profit is attributable to the Android platform, or conversely, that all AdSense and Display Ad Revenue, TAC and profit is attributable to Search Ads Technologies and Services. If this is, in fact, Dr. Leonard’s position, a necessary underlying assumption is that Google would have achieved 100 percent of the AdSense and Display Ad Revenues it realized through Android devices, regardless of whether or not the Android operating system was developed and commercialized. If this is Dr. Leonard’s position, it is undermined by several factors.
101. First, Google considered the risks that it faced of being locked out of other platforms, and considered those risks to be so material that it would undertake a long-term strategy of building its own platform. Google necessarily concluded either that the risk to achieving the revenue, or the risk of a dramatically increased cost of acquiring the revenue, was so high that a lengthy and expensive build-your-own approach was warranted. Even after it was faced with this lawsuit, Google’s President of Platforms and Mobile Media concluded that the risk to Google of missing



the “critical mobile window” was an existential one—stating that Google will be “out of business in 10 years” if it does not capture the mobile business.<sup>92</sup>

102. This lockout/control issue applies to display advertising as well as other types. For example, modern web browsers have built-in capabilities, or add-on extensions, that allow for ad-blocking. The Safari “Reader View” is an ad-blocking capability.<sup>93</sup> Microsoft also has a built-in ad-suppression feature for its Edge web browser called “Reading View.”<sup>94</sup>
103. In addition, I understand that AdSense and Display Ad Revenues are influenced by Android user data collected by Google. I understand that Google utilizes user data collected from Android devices to direct relevant AdSense and Display advertising to Android users and/or to direct users to Google and Google Network Partner websites. This results in increased Display and AdSense Ad Revenues. Absent this Android user data, Google would not achieve the same levels of AdSense and Display revenues and profits.
104. Third, without its own dominant position as a mobile platform provider, Google could not be assured of the same favorable terms for traffic acquisition on competitive platforms.
105. In **Sections 4.2-4.4** above, I set forth the limitations of Dr. Leonard’s “iPhone Recapture Adjustment.” Those limitations undermine Dr. Leonard’s presumed assertion that some portion of the AdSense and Display Ad Revenue realized from Android devices would have been realized through iPhones in the absence of Android devices.
106. In addition to the limitations of Dr. Leonard’s “Diversion Ratio” theory, his presumed theory that the remaining (56 percent) portion of Android-generated AdSense and Display Ad Revenue would have been “diverted” to non-iPhone devices in the absence of Android lacks merit.

#### **4.5.7 Dr. Leonard’s General & Administrative Expense Allocation is Improper**

107. Like his “top-down” “Android-Related Profits” analysis contained in Leonard Exhibit 1a.1, Dr. Leonard’s “top-down” “Android Profits” analysis reflected in Leonard Exhibit 1a.4 improperly allocates “Android General and Administrative” expenses of \$1.5 billion to the Android platform.<sup>95</sup> This allocation is improper for the same reasons set forth in Section 4.5 above.

#### **4.6 Dr. Leonard’s Top-Down (“Lines of Code”) Apportionment Methodology is Unreliable**

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108. The “top-down” apportionment methodology reflected in the Leonard Report is purportedly based on the percentage of Android’s total lines of source code represented by the Infringed Java

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<sup>92</sup> GOOGLE-23-00000049.

<sup>93</sup> <http://fortune.com/2015/09/22/ad-block-ios-android/>.

<sup>94</sup> <http://www.engadget.com/2015/07/30/microsoft-edge-windows-10/>

<sup>95</sup> Expert Report of Dr. Leonard, February 8, 2016, Exhibit 1a.1.



Copyrights. Such an apportionment methodology is invalid, and has been rejected by federal courts.<sup>96</sup> A straight “lines of code” allocation does not account for the *value* that the Java APIs offered to the platform. For example, according to the United States District Court for the Northern District of California in an unrelated matter, “[a]lthough A10 points to the ratio between the 145 lines of infringing code and the 10 million lines of code in Brocade's product, that ratio fails to account for the evidence suggesting the importance of the implementing code to Brocade's software.”<sup>97</sup>

109. Apportionment is supposed to assign merit to the relative contribution between the infringing and noninfringing portions in generating the profits at issue. In other words, the apportionment methodology is supposed to be a reasonable approximation of the value contributed by the copyrighted material. Value takes into account many factors other than just lines of code.
110. Google's apportionment approach is invalid because the percentage of total lines of Android source code represented by the Infringed Java Copyrights is not indicative of the value of the Infringed Java Copyrights.
111. Moreover, according to the lines of code technical analysis performed by Oracle's expert Dr. Schmidt, a significant portion of the lines of code in Android include contributions from other third parties, blank lines, comments, and unspecified code authorship on which Google has not affixed a copyright notice.<sup>98</sup> Dr. Leonard's analysis implicitly assigns equal value to every single one of these lines of code. Evidence that demonstrates that the value of the Infringed Java Copyrights far exceeds that suggested by Dr. Leonard's apportionment methodology is discussed in the following subsections.

#### **4.6.1 Android Does Not Work Without the Infringed Java Copyrights**

112. I understand that the Android platform is critically dependent on the 37 Java APIs, both individually and collectively. According to Dr. Schmidt, the build process fails if the files from even one of the infringing 37 Java APIs are removed. As a result, Android will not run on a mobile device without all of the copied declaring code and the full set of files for the 37 Java APIs.<sup>99</sup> According to Dr. Schmidt, Android is not usable on a computing device, such as a phone or tablet, without each of the 37 Java APIs, or the copied declaring code in them.<sup>100</sup>

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<sup>96</sup> See, *Computer Associates Int'l, Inc. v. Altai, Inc.*, 775 F.Supp. 544, 571 - 572 (E.D.N.Y. 1991); *Brocade Communications Systems, Inc. v. A10 Networks, Inc.*, 2013 WL 831528 (N.D.Cal).

<sup>97</sup> *Brocade Communications Systems, Inc. v. A10 Networks, Inc.*, 2013 WL 831528 (N.D.Cal).

<sup>98</sup> Expert Report of Dr. Schmidt, February 29, 2016, Figures 1 and 2.

<sup>99</sup> Expert Report of Dr. Schmidt, January 8, 2016, ¶ 121.

<sup>100</sup> Expert Report of Dr. Schmidt, January 8, 2016, ¶ 78



113. Conversely, I understand that many of the other Android APIs could be removed from the Android source code without causing the build process to fail.<sup>101</sup> This is because most of the other APIs are not part of the Android core library.<sup>102</sup> The fact that the Android build process fails if any one of the 37 Java APIs is removed from the Android source code indicates that the Infringed Java Copyrights are relatively more valuable than other Android platform components including other Android APIs and other segments of the Android source code.

#### **4.6.2 The Infringed Java Copyrights Provided Stability to the Android Core Library**

114. As indicated in my Initial Report, Mr. Reto Meier, an Android developer advocate at Google since 2009, testified that Google copied the core Java APIs into Android instead of creating its own because “utilizing the same [Java APIs] would make it easier for folks to -- to use [Android] if they had experience with [the Java APIs].”<sup>103</sup> Bob Lee, head of Android’s core library team at Google, agreed in his deposition that the 37 APIs “are [the] good stuff from Java.”<sup>104</sup> Dan Bornstein, technical lead of Android’s Dalvik virtual machine and core libraries team at Google, agreed in his direct examination that, “absolutely,” his “determination of what packages would be implemented in the core library” was related to his “expectations of Java language programmers.”<sup>105</sup>
115. According to Dr. Kemerer, the 37 Java APIs represent 73 percent of the stable Android core library.<sup>106</sup> According to Dr. Kemerer, the 37 Java APIs render the Android platform 82 percent more stable.<sup>107</sup> I also understand that 37 Java APIs stabilized around 10.9 years after the first release of the JDK whereas the Android Core APIs stabilized after only 2.3 years after the first release of Android.<sup>108</sup> Had the Android Core libraries taken 10.9 years to stabilize, Google would have missed the timing window to enter the mobile handset market when it did and would have been unable to launch the Android handset on time. Thus, the relative importance of the Android core library to the Android platform, and the significance of the Infringed Java Copyrights to the stability of the Android platform indicate that the Infringed Java Copyrights are more valuable than a value indicated by an approach based on a percentage-of-lines-of-source-code ratio, such as that utilized by Dr. Leonard.

#### **4.6.3 The 37 Java APIs are Called Upon More Often by Popular Mobile Applications**

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<sup>101</sup> Expert Report of Dr. Schmidt, February 29, 2016, ¶ 76.

<sup>102</sup> See Section 6 below.

<sup>103</sup> Deposition of Reto Meier, December 11, 2015, p. 113.

<sup>104</sup> Deposition of Bob Lee, August 3, 2011, p48.

<sup>105</sup> Trial Testimony of Daniel Bornstein, Transcript Vol. 08, April 25, 2012, p. 1782.

<sup>106</sup> Expert Report of Dr. Kemerer, January 8, 2016, ¶ 108.

<sup>107</sup> Expert Report of Dr. Kemerer, February 29, 2016, ¶ 27.

<sup>108</sup> Expert Report of Dr. Kemerer, February 29, 2016 ¶ 17.



116. According to Dr. Kemerer, an analysis was conducted to assess the relative importance of the 37 Java APIs in the Android App ecosystem from the perspective of App developers.<sup>109</sup> According to Dr. Kemerer, “the initial analysis empirically demonstrates the extent to which developers depend on the declarations provided by the infringed packages in the development of Android apps.”<sup>110</sup>
117. The analysis, as described in the Kemerer Report consisted of selecting the top 100 Apps for analysis.<sup>111</sup>
118. Based on this analysis, Dr. Kemerer concluded that:

*[T]he 37 Java APIs are a critical requirement for essentially every one of the 100 top applications. In fact, every one (100%) of the top 100 apps depends upon a minimum of three of the 37 copied Java API packages. The average number of dependencies is 11.5, or nearly a third of the 37 copied API packages. And one of the top 100 apps depends on 23 of the 37 copied API packages.<sup>112</sup>*

*If the analysis is restricted to the most popular of the 100 apps (the 14 apps that are listed as having between 1,000,000,000 and 5,000,000,000 downloads), they can be seen as being even more dependent upon the 37 copied API packages, with the minimum number of dependencies being eight, the average number 13.8, and the maximum number 17.<sup>113</sup>*

119. This analysis indicates that application level dependencies on the 37 Java APIs are significant, and central to the Android app ecosystem and its developers.<sup>114</sup>
120. Dr. Leonard asserted that “most games, for example are written in C++ because of the performance benefits inherent in avoiding the use of the virtual machine.”<sup>115</sup> I understand from Dr. Kemerer’s analysis of NDK Application Dependency, he found that contrary to Dr. Leonard’s assertions, very popular apps and games are heavily dependent on significant numbers of the 37 Java APIs. Some of the applications analyzed include Candy Crush, Instagram, Snapchat, Twitter and Angry Birds.<sup>116</sup>
121. Thus, it appears that Dr. Leonard’s assertions minimizing the importance of the 37 APIs to popular mobile applications is factually incorrect. Since the dependency on the 37 API is demonstrably significant, it is evident that the relative importance of the Infringed Java Copyrights

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<sup>109</sup> Expert Report of Dr. Kemerer, January 8, 2016, ¶ 126.

<sup>110</sup> Expert Report of Dr. Kemerer, January 8, 2016, ¶ 126.

<sup>111</sup> Expert Report of Dr. Kemerer, January 8, 2016, ¶ 134.

<sup>112</sup> Expert Report of Dr. Kemerer, January 8, 2016, ¶ 135.

<sup>113</sup> Expert Report of Dr. Kemerer, January 8, 2016, ¶ 136.

<sup>114</sup> Expert Report of Dr. Kemerer, January 8, 2016, ¶ 140.

<sup>115</sup> Expert Report of Dr. Leonard, February 8, 2016, ¶ 110.

<sup>116</sup> Expert Report of Dr. Kemerer, February 29, 2016, Table 2: Dependence of Leonard-identified “NDK” Android apps on the 37 copied packages



to the Android app ecosystem and its developers indicates that the Infringed Java Copyrights are more valuable than the value indicated by an apportionment approach based on a percentage-of-lines-of-source-code ratio, such as the approach adopted by Dr. Leonard.

#### 4.6.4 Google's Own Page Rank Score Demonstrates the Centrality of the 37 Java APIs

122. According to Dr. Kemerer, “centrality” is a metric that is used to describe the relative importance of a particular entity, or node, within a network of interconnected entities.<sup>117</sup> According to Dr. Kemerer, “[a]pplying the notion of network centrality to the 37 Java API packages within the context of the Android source code as a whole is one way to understand how important those packages are to Android.”<sup>118</sup> According to Dr. Kemerer, a high centrality score for the 37 Java APIs would indicate that the classes inside of them are connected to a high number of classes in packages outside of those packages. Such a pattern would indicate that the rest of the Android source code heavily depends on the 37 Java APIs.<sup>119</sup>
123. I understand that “PageRank” is a centrality measure that was developed by Larry Page and Sergey Brin as part of their research to develop a new search engine.<sup>120</sup> According to Dr. Kemerer, PageRank is now a widely referenced tool for network analysis, and is an appropriate metric for evaluating the centrality of the 37 Java APIs in the Android source code.<sup>121</sup>
124. A PageRank analysis was undertaken to identify the extent to which the Android source code leverages the functionality provided by the 37 Java APIs.<sup>122</sup> The Android PageRank analysis produced a “PageRank score” for those classes which belong to the 37 Java APIs, as well as PageRank scores for the rest of the class groupings across the wider Android source code (i.e., the non-copied classes).<sup>123</sup>
125. Figure 11 of the Kemerer Report compares the average PageRank score of the classes which belong to the 37 Java APIs to the average PageRank score of other classes within the Android source code (“non-copied classes”). According to Dr. Kemerer, Figure 11 to his report “very clearly demonstrates the vastly greater PageRank scores of copied classes, with the average copied class boasting a score that is over 30 times greater than that of the average non-copied class.”<sup>124</sup>

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<sup>117</sup> Expert Report of Dr. Kemerer, January 8, 2016, ¶ 141.

<sup>118</sup> Expert Report of Dr. Kemerer, January 8, 2016, ¶ 143.

<sup>119</sup> Expert Report of Dr. Kemerer, January 8, 2016, ¶ 144.

<sup>120</sup> Expert Report of Dr. Kemerer, January 8, 2016, ¶ 146.

<sup>121</sup> Expert Report of Dr. Kemerer, January 8, 2016, ¶ 148.

<sup>122</sup> Expert Report of Dr. Kemerer, January 8, 2016, ¶ 150. I understand that the Android software system network used in this analysis considers every single Java class from Version 5.1.0, release 1 (Lollipop) of the Android Open Source Project (AOSP) source code.

<sup>123</sup> Expert Report of Dr. Kemerer, January 8, 2016, ¶ 152.

<sup>124</sup> Expert Report of Dr. Kemerer, January 8, 2016, ¶ 153.



According to Dr. Kemerer, “[t]hese PageRank results show the importance of the 37 copied Java API packages to the network of the Android operating system.”<sup>125</sup>

126. The relative importance of the Infringed Java Copyrights to the network of the Android operating system indicates that the Infringed Java Copyrights are more valuable than the value indicated by an apportionment approach based on a percentage-of-lines-of-source-code ratio, such as the approach adopted by Dr. Leonard.

#### **4.6.5 The 37 Java APIs Enabled Google to Get Android to Market More Quickly**

127. According to Dr. Kemerer, when Android was first created, Google benefited by leveraging the popularity and familiarity of the Java platform (including the Infringed Java Copyrights) among developers in order to quickly attract them to the Android platform.<sup>126</sup> I understand that developers are generally most familiar with declaring codes and SSO elements, and less familiar with the underlying implementing code.<sup>127</sup> Google’s use of the 37 Java APIs thus hastened the attraction of millions of developers’ familiarity with the Android platform and assisted in Google’s success in reaching and building a significant core of application developers.
128. Developers’ familiarity with the Java platform, including the 37 APIs, not only attracted developers to the Android platform, but also enhanced the developers’ productivity.<sup>128</sup> APIs allow for the faster, more efficient construction of high quality applications. Rather than engaging in the more laborious task of writing sequences of program code from scratch, developers were able to draw on the resources of the Java APIs, and use the packaged classes and methods to more easily create high quality programs.<sup>129</sup>
129. By using the familiar Java APIs, Google both attracted more developers to the Android platform and made the work of those developers easier, thus further accelerating the development and acceptance of the Android platform.<sup>130</sup> Google needed to develop a mobile platform quickly to establish its presence in the market and to start the process of monetizing data from user engagement with applications and devices.<sup>131</sup>
130. Google was motivated to get to this market quickly before competing mobile platforms gained significant market share at Google’s expense, and before it lost the opportunity to dominate the

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<sup>125</sup> Expert Report of Dr. Kemerer, January 8, 2016, ¶ 153.

<sup>126</sup> Expert Report of Dr. Kemerer, January 8, 2016, ¶ 64.

<sup>127</sup> Expert Report of Dr. Kemerer, January 8, 2016, ¶ 76.

<sup>128</sup> Expert Report of Dr. Schmidt, January 8, 2016, ¶ 75.

<sup>129</sup> Expert Report of Dr. Kemerer, January 8, 2016, ¶ 22.

<sup>130</sup> Expert Report of Dr. Kemerer, January 8, 2016, ¶ 94.

<sup>131</sup> Expert Report of Dr. Kemerer, January 8, 2016, ¶ 66.



mobile platform so that it could generate revenue from advertising.<sup>132</sup> The record evidence illustrating Google's motivation is substantial, and includes the following:

▪ ***Sworn Testimony of Andrew Rubin:***

*Q. And why did you want to accelerate your effort?*

*A. Why did I want to get to market faster?*

*Q. Yes.*

*A. Because I think it's a competitive advantage to come to market as quickly as possible.<sup>133</sup>*

...

*Q. And what was the value of getting to market quickly to Google?*

*A. It gave us a competitive advantage.*

*Q. Against whom?*

*A. The existing incumbent platform manufacturers.*

*Q. Which were whom?*

*A. At the time, Microsoft, Symbian, RIM. Motorola had a couple of platforms.<sup>134</sup>*

...

*Q. The deadline you were talking about, the December 2006 deadline, you said, "I was under incredible schedule pressure."*

*A. Yep.*

*Q. What did you mean by that?*

*A. Well, look, I mean, you have a window of opportunity in smartphones. I had competitors all over the place. When I started the company, Microsoft was my competitor. You know, there was Symbian in there as well, and, you know, all sorts of Linux initiatives. You have to ship as soon as feasibly possible.*

*I mean, you go to extraordinary length to ship sooner, because it's a very dynamic market. And it could shift directions at any time. Right. So my job as, you know, the architect of this business concept was to just do everything that I possibly could to get my solution to the market in the shortest time possible.<sup>135</sup>*

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<sup>132</sup> Dr. Schmidt Trial Testimony, April 24, 2012, 1456:15-19, 1457:19-25, 1458:1-16

<sup>133</sup> Deposition of Andrew Rubin, April 5, 2011, p. 38.

<sup>134</sup> Deposition of Andrew Rubin, April 5, 2011, p. 103.

<sup>135</sup> Deposition of Andrew Rubin, July 27, 2011, pp. 179-180.



▪ ***Sworn Testimony of Eric Schmidt:***

*Q. And one of the reasons that you were interested in having Android proceed as fast as it could was you wanted to beat Microsoft and Symbian to volume, correct?*

*A. Yes.*

*Q. And by beating Microsoft and Symbian to volume, you mean getting your handset out there with a lot of users before they had their handsets out there with a lot of user[sic]; is that fair?*

*A. Yes. Volume means more users, so serving more customers.*<sup>136</sup>

- **A July 24, 2006 Andrew Rubin Email:** indicates that Google was “in discussions for 8 months with Sun, walked away, and must prove that our internal effort is clean. Also, because we were in discussions for so long, we must acquire an existing implementation. We ship in 6 months!”<sup>137</sup>
- **A January 2, 2006 Google Email:** from Brian Swetland indicates that the “[r]easons to shift to a primarily Java API . . . simplifies the application development story . . . reduces our development time . . . faster app development and debuggability.”<sup>138</sup>
- **A 2006 Google Presentation:** describes the importance of leveraging Java developers and avoid the need to create a large developer services organization. According to the presentation, “[s]upporting Java is the best way to harness developers. Fact: Linux fragmentation threatens value. Tools and new app frameworks are biggest hurdles. 6M Java developers worldwide. Tools and documentation exist to support app development without the need to create a large developer services organization. There exist many legacy Java applications. The wireless industry has adopted Java, and the carriers require its support. Strategy: Leverage Java for its existing base of developers.”<sup>139</sup>

#### **4.7 Dr. Leonard’s Bottom-Up (Cost Based) Apportionment Methodology is Unreliable**

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131. According to Dr. Leonard, “I understand that a plaintiff can seek ‘unjust enrichment’ damages, which are any profits of the infringer that are attributable to the infringement and are not taken into account in computing the plaintiff’s actual damages.”<sup>140</sup> Dr. Leonard cites to 17 U.S.C. §504(b) in support of this statement.<sup>141</sup> However, contrary to the opinion put forth by Dr. Leonard, “unjust enrichment” is not referenced in 17 U.S.C. §504(b) as a measure of monetary recovery for copyright infringement.

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<sup>136</sup> Trial Testimony of Dr. Schmidt, April 24, 2012, p. 1458.

<sup>137</sup> Trial Exhibit 147, GOOGLE-01-00023889-890.

<sup>138</sup> Trial Exhibit 13, GOOGLE-01-00019511-513 at 513.

<sup>139</sup> GOOGLE-01-00025575-587 at 584.

<sup>140</sup> Expert Report of Dr. Leonard, February 8, 2016, pp. 7-8.

<sup>141</sup> 17 U.S.C. §504(b).



132. 17 U.S.C. §504(b) specifically states as follows:

*The copyright owner is entitled to recover the actual damages suffered by him or her as a result of the infringement, and any profits of the infringer that are attributable to the infringement and are not taken into account in computing the actual damages. In establishing the infringer's profits, the copyright owner is required to present proof only of the infringer's gross revenue, and the infringer is required to prove his or her deductible expenses and the elements of profit attributable to factors other than the copyrighted work.*<sup>142</sup>

133. As 17 U.S.C. §504(b) indicates, the measures of monetary recovery for copyright infringement include the actual damages suffered by the copyright owner “and any profits of the infringer that are attributable to the infringement and are not taken into account in computing the actual damages.”<sup>143</sup> Nowhere does the statute mention the concept of “unjust enrichment”.

134. The American Institute of Certified Public Accountants (“AICPA”) represents the CPA profession nationally regarding rule-making and standard setting. The AICPA develops professional standards and monitors and enforces compliance with the professional’s technical and ethical standards.<sup>144</sup> Technical Practice Aids are a source of various authoritative and non-authoritative or implementation guidance issued by the AICPA and other organizations. Technical Practice Aids include questions and answers issued by the AICPA on a variety of accounting, auditing and industry topics.<sup>145</sup>

135. In 2013, the AICPA issued a Practice Aid entitled “Calculating Intellectual Property Infringement Damages” which sets forth the standards for calculating monetary recovery for copyright infringement. According to the AICPA:

*17 USC 504 authorizes courts to grant copyright owners actual damages suffered as a result of the infringement. In addition, any profits of the infringer attributable to the infringement are granted to the copyright owner in order to remedy the damages caused by the infringement, as long as these damages are not duplicative. Should the copyright owner be unable to prove actual damages or the defendant's profits, 17 USC 504 alternatively grants the copyright owner the right to elect . . . to recover an award of statutory damages instead of actual damages and profits.*<sup>146</sup>

136. As seen above, the AICPA Practice Aid does not mention “unjust enrichment” in connection with copyright infringement. And furthermore, the only mention of “unjust enrichment” as a form of monetary recovery in the AICPA Practice Aid is with respect to monetary recovery for trade secret

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<sup>142</sup> 17 U.S.C. §504(b).

<sup>143</sup> 17 U.S.C. §504(b).

<sup>144</sup> <http://www.aicpa.org/about/missionandhistory/pages/missionhistory.aspx>

<sup>145</sup> <http://www.aicpa.org/publications/accountingauditing/techpractaids/pages/technicalpracticeaids.aspx>

<sup>146</sup> Forensic & Valuation Services Practice Aid – Calculating Intellectual Property Infringement Damages, AICPA, 2013, p. 20.



misappropriation.<sup>147</sup> The Uniform Trade Secrets Act specifically references “unjust enrichment” in its remedies provisions.<sup>148</sup> Thus, Dr. Leonard’s approach to calculating the measure of monetary recovery in this case is not only inconsistent with 17 U.S.C. §504(b), but it is also inconsistent with highly recognized standard setting organizations which provide guidance on its implementation.

137. With specific regard to Dr. Leonard’s opinions, the Leonard Report includes three “bottom-up” approaches which attempt to measure the “cost savings” enjoyed by Google as a result of its illegal use of the Infringed Java Copyrights. Avoided costs can be a measure of unjust enrichment (as can a head start benefit calculation), but it is not a measure of actual profit disgorgement. Avoided costs is a way of measuring a different benefit received by the defendant—the benefit of avoiding a cost that should have been paid for use of the intellectual property at issue. In this case, for example, such a benefit might be characterized by whatever license fee Google did not have to pay to Sun and Oracle for using the Infringed Java Copyrights. Here there was no such license and so the avoidance of that payment would be entirely hypothetical. It is my understanding that in copyright cases such hypothetical, or constructive licenses, are considered a form of actual damages to the plaintiff rather than profit disgorgement by the defendant. From a financial perspective, the hypothetical license is simultaneously lost revenue to the plaintiff and a cost foregone by the defendant. This has nothing to do with profits earned by the defendant because of infringement. My opening report sets forth no hypothetical license fee as part of Oracle’s claim for damages in this case.
138. In connection with preparing his three “bottom-up” approaches, Dr. Leonard analyzes a “counterfactual” (i.e. “but-for”) world and concludes that Google would have incurred certain costs had it not used the Infringed Java Copyright in connection with its development of Android. Although Dr. Leonard opines that “[t]he appropriate measure of the apportionment of Google’s Android-related profits to the alleged infringement using the bottom-up approach is the minimum among the three cost-savings and the profit loss,”<sup>149</sup> his cost savings metrics clearly do not reflect an apportionment of Google’s causally connected profits. Rather, they improperly reflect an unjust enrichment theory of damages. In the paragraphs that follow, I provide a further critique of the analytics and related assumptions underlying Dr. Leonard’s “bottom-up” approaches to apportionment.
139. Dr. Leonard’s use of cost savings to apportion Google’s causally connected profits related to infringing attributes of the Android Platform is unsupported by case law. Specifically, in his “bottom-up” apportionment, Dr. Leonard calculates the “generated cost savings for Google by allowing Google to avoid taking certain costly actions.”<sup>150</sup> I am unaware of any legal basis for using the cost savings associated with non-infringing alternatives for disgorgement, which I believe

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<sup>147</sup> Forensic & Valuation Services Practice Aid – Calculating Intellectual Property Infringement Damages, AICPA, 2013, p. 22.

<sup>148</sup> [http://www.uniformlaws.org/shared/docs/trade%20secrets/utsa\\_final\\_85.pdf](http://www.uniformlaws.org/shared/docs/trade%20secrets/utsa_final_85.pdf), Section 3, Damages.

<sup>149</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 94.

<sup>150</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 84.



is the appropriate measure of recovery in this matter. In fact, I understand this Court has previously ruled against Google on this very issue:

*In his damages report, Dr. Cox opined: 'The ready availability of obviously acceptable non-infringing alternatives also provide [sic] basis that the 'element of profit' that is attributable to the allegedly infringed API claim contained in the Android framework is very small or zero.*

...

*As Dr. Cox makes clear in his report, the existence of 'multiple acceptable and effective' non-infringing alternatives 'at little or no additional cost' greatly reduces the lost licenses fees (Cox Report 61). This order finds this aspect acceptable. Not acceptable, however, is allowing the existence of non-infringing alternatives to reduce recovery of wrongful profits. This is a distinct remedy for the purpose of disgorgement. Non-infringing alternatives have nothing to do with this.<sup>151</sup>*

140. Akin to Dr. Cox, Dr. Leonard relies on a cost savings based analysis to reduce Oracle's recovery of Google's wrongful profits and determine the profit attributable to the Infringed Java Copyrights is very small.
141. What's more, each of the cost savings calculations Dr. Leonard relies on are fundamentally flawed and lack sufficient support. Dr. Leonard's cost saving scenarios are listed below, and my comments regarding each are provided in the sections that follow.
  - Costs associated with switching to OpenJDK
  - Costs associated with developer training in C/C++
  - Costs associated with paying third party developers to develop Android apps in C/C++<sup>152</sup>

#### **4.7.1 Avoidance of Costs Associated with Switching to Open JDK**

142. Dr. Leonard states that the most appropriate measure of apportionment is the avoidance of costs associated with Google switching to OpenJDK, which he quantifies at \$85,000.<sup>153</sup> The Murray, Jaffe, and Schmidt Reports each provide ample evidence for why OpenJDK was not a viable economic or technical alternative for Google and the record evidence shows that Google rejected it because it wasn't a commercially viable alternative. Below I summarized what I believe to be the most notable defects in Dr. Leonard's analyses in the section below:
  - Dr. Leonard ignores the business and risk factors that Google and its OEMs and carriers would have considered.
  - Dr. Leonard disregards that OpenJDK was not an adequate alternative due to performance and compatibility issues.

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<sup>151</sup> Doc. 632 (Order Granting, in Part, Oracle's Motion to Exclude Portions of Leonard & Cox).

<sup>152</sup> Expert Report of Dr. Leonard, February 8, 2016, pp. 84-88.

<sup>153</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 87.



- Dr. Leonard ignores that Google intentionally rejected the use of OpenJDK.

#### 4.7.1.1 Dr. Leonard Ignores the Business and Risk Factors that Android and its OEMs Would Have Considered

143. Google faced a limited window of opportunity to launch Android, and if Google missed that window, Android faced being locked out of the mobile market. In addition, the payouts to Andy Rubin and his team connected to the Android acquisition were contingent upon reaching Milestones which included developing a working phone and securing a relationship with a major carrier; otherwise all future earn-out payments would be forfeited. For at least these reasons, Google did not want its platform subject to a “viral” license such as GPLv2-CE (e.g. OpenJDK).
144. Commercial exploitation under the GPLv2 is impractical and Google acknowledged the significant risk that GPL-related licensing presented to partner adoption and thus time-to-market imperatives. Under OpenJDK, there was substantial risk that OEM and mobile carriers would be required to open-source their modifications to the Android platform under the relevant GPL license.<sup>154</sup> For this reason, most, if not all, commercial entities implementing Java for use in a device have declined OpenJDK and instead done so under a commercial license.
145. In a November 12, 2006 email, Andy Rubin proclaimed “GPL license (sun’s license doesn’t work for us.”<sup>155</sup>
146. In an August 11, 2007 email to Bob Lee, Brian Swetland and Dan Bornstein, all Google/Android engineers, Andy Rubin discusses the challenges posed to OEMs and mobile carrier by using GPL in Android and why Google would want to distance itself from GPL licenses as much as possible:<sup>156</sup>

*... and as far as GPL-ing the VM, everything that is linked with the VM would get infected.*

*The problem with GPL in embedded systems is that it’s viral, and there is no way (for example) OEMs or Carriers to differentiate by adding proprietary works. We are building a platform where the entire purpose is to let people differentiate on top of it.*

*Finally, Sun has a different license for its library for SE and ME. The SE library is LGPL, ME library is GPL. That means anything that links with the ME library gets infected. And the SE library is not optimized for embedded systems.*

*Sun chose GPL for this exact reason so that companies would need to come back to them and take a direct license and pay royalties.*

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<sup>154</sup> Expert Report of Gwyn Murray; <http://arstechnica.com/uncategorized/2007/11/why-google-chose-the-apache-software-license-over-gplv2/>.

<sup>155</sup> Trial Exhibit 154 (GOOGLE-01-0002454 – 457); Deposition of Anwar Ghuloum, December 9, 2015, p. 35 – 36, Trial Exhibit 230.

<sup>156</sup> Trial Exhibit 230; Exhibit 3 to the Deposition of Andy Rubin, April 5, 2011, GOOGLE-02-00020474-475 at 474.



*Tricky, no? Why would we want to do anything to support this behavior? We want to distance ourselves as much as possible from Sun.*

*-andy*

147. During the same time frame, Google publicly expressed concern over what using OpenJDK for Android code would mean to its OEMs. In a report on the 2008 Google I/O conference, one observer explained:

*The first and main reason they give us for using Harmony instead of OpenJDK is the GNU license (GPL). Cell phone makers want to link proprietary value-add code directly into the system (into JVM-based apps, and/or service processes), and they do not want to worry about copyleft. Perhaps there is some education needed here about the classpath exception. (I know I don't understand it; maybe they don't either. And their license wonks appear to have a well-considered preference for Apache 2 over GPL+CPE.)<sup>157</sup>*

148. In 2008, Andy Rubin confirmed that Google deliberately chose to release Android under the Apache license in order to avoid the risks that a GPL license might impose on OEMs. In an interview to CNET in 2008, he explained:

*The thing that worries me about GPL is this: suppose Samsung wants to build a phone that's different in features and functionalities than (one from) LG. If everything on the phone was GPL, any applications or user interface enhancements that Samsung did, they would have to contribute back. At the application layer, GPL doesn't work.<sup>158</sup>*

149. Similarly, the Open Handset Alliance website explains that the reason for choosing the Apache License for Android is to enable handset manufacturers to keep their innovations and differentiated features as closed source, which could not have been accomplished using other licenses.

*Apache is a commercial-friendly [sic] open source license. The Apache license allows manufacturers and mobile operators to innovate using the platform without the requirement to contribute those innovations back to the open source community. Because these innovations and differentiated features can be kept proprietary, manufacturers and mobile operators are protected from the "viral infection" problem often associated with other licenses<sup>159</sup>*

150. Potential commercial licensees have always expected that they only had limited options: (1) they could pay for a commercial license for Java, including the APIs, which required the implementation to pass the Java Compatibility Kit (JCK) tests (also referred to as the "TCK" for Technology Compatibility Kit tests); (2) they could create an independent implementation of the specification, under a different license, which also required that the implementation passed the TCK; or (3) they

<sup>157</sup> [https://blogs.oracle.com/jrose/entry/with\\_android\\_and\\_dalvik\\_at](https://blogs.oracle.com/jrose/entry/with_android_and_dalvik_at).

<sup>158</sup> <http://www.cnet.com/news/why-oracle-not-sun-sued-google-over-java/>.

<sup>159</sup> [http://www.openhandsetalliance.com/android\\_faq.html](http://www.openhandsetalliance.com/android_faq.html).



could take the GPLv2-CE license, which relieved them of compatibility requirements, but mandated that they would have to release their source code under the terms and conditions imposed by that license.

151. Except for Google and its development of Android, most, if not all, commercial entities implementing Java for use in a device have done so under a commercial license. Google required the prompt buy-in of OEMs and carriers to be able to successfully launch Android. The threat of having to open-source proprietary modifications under OpenJDK's GPLv2-CE would have put those partnerships at risk, undermined Google's ability to achieve early entry, and threatened the ultimate success of Android.<sup>160</sup>

#### **4.7.1.2 Dr. Leonard Neglects to Mention that Google Intentionally Rejected the Use of OpenJDK**

152. Google intentionally *rejected* the use of GPLv2-based OpenJDK.<sup>161</sup> If implementing OpenJDK for \$85,000 was a viable alternative, economic logic dictates that Google would have done so.<sup>162</sup> Google faced known risks and made “enemies” using the Infringed Java Copyrights without a license. Therefore, it does not make sense for Google to have borne those risks and make those enemies, if they could easily have been avoided for \$85,000. Assuming Google seeks to maximize long-term profits, this suggests that OpenJDK was not, and has not been, an economically favorable choice for Google.
153. After bringing Android to market, Google acknowledged the looming lawsuit it would surely face because of its unauthorized copying of Java in Android. In August 2010, Mr. Lindholm wrote to Andy Rubin that Google's founders Larry Page and Sergey Brin had asked him “to investigate what technical alternatives exist to Java. . . .” Lindholm added that his team had “been over a bunch of [alternatives to Java]” and that “they all suck.” His conclusion was “that [Google] need[ed] to negotiate a license for Java . . . .”<sup>163</sup>

#### **4.7.2 Avoidance of Costs Associated with Developer Testing**

154. Dr. Leonard's calculation of the \$2.3 million in avoided costs associated with training developers in C/C++ is incorrect for at least the following reasons, which I describe further in the sections that follow:
  - Dr. Leonard incorrectly conflates replacing the Java Community with replacing the Java language
  - Dr. Leonard exaggerates the utilization of NDK and provides no support for C/C++ as a reasonable alternative

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<sup>160</sup> GOOGLE-02-00020474; Expert Report of Dr. Kemerer, February 8, 2016, ¶ 258.

<sup>161</sup> Trial Exhibit 154.

<sup>162</sup> <http://venturebeat.com/2015/12/29/google-confirms-next-android-version-wont-use-oracles-proprietary-java-apis/>.

<sup>163</sup> GOOGLE-12-10000022.



- Dr. Leonard greatly underestimates the full cost to replace Java-based apps in the Google Play store

#### **4.7.2.1 Dr. Leonard Incorrectly Conflates Replacing the Java Community With Replacing the Java Language**

155. By limiting his analysis to the costs associated with replacing the Java language contained in certain mobile apps, Dr. Leonard inherently mischaracterizes the use made of the Infringed Java Copyrights by Google. Google derived great value not only through the use of the Java platform, but more importantly through the poaching of the vast Java Community, that included OEMs, carriers and developers. In 2005, more than 25 manufacturers had enabled Java on over 200 different models of mobile phones. This included 44 devices from Samsung, 39 devices from Nokia, 33 devices from Motorola, and 19 devices from Siemens, among others.<sup>164</sup> Through a network of over 70 carriers, “tens of thousands” of applications were available across a worldwide user base that had purchased at least 120 million phones by 2005.<sup>165</sup> By 2007, Java-based phone adoption had grown to 85% of all phones at the time.<sup>166</sup> In an e-mail from Andy Rubin to Larry Page on October 11, 2005, Mr. Rubin acknowledged that Java has advantages and that it was “the #1 choice for mobile development.”<sup>167</sup>
156. A 2006 Sun presentation illustrates the widespread success of the Java Community that Google obtained through its use of the Infringed Java Copyrights, highlighting the platform’s ubiquity and potential for future growth among numerous markets.

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<sup>164</sup> OAGOOGL3000000021-024.

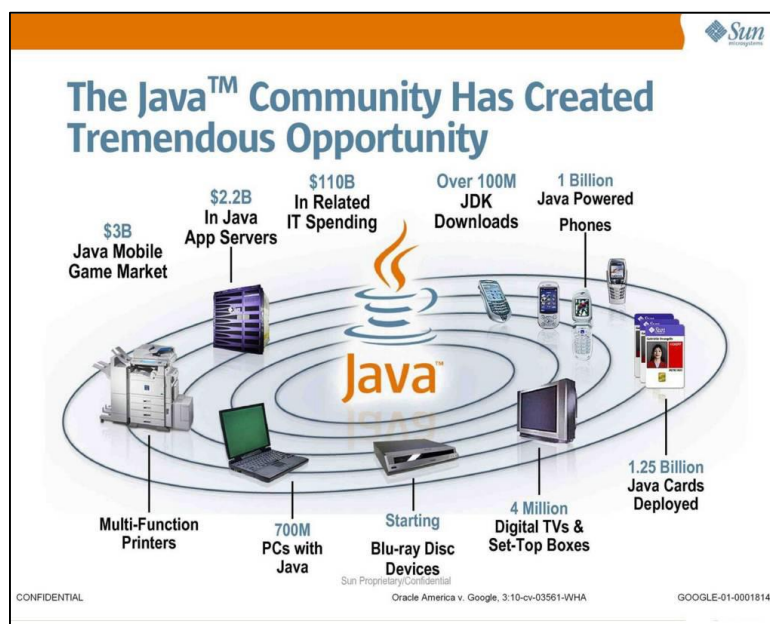
<sup>165</sup> OAGOOGL3000000021-024; <http://www.prnewswire.com/news-releases/sun-strengthens-lead-in-worldwide-mobile-data-services-with-java-72506432.html>.

<sup>166</sup> OAGOOGL0004260166-187 at 167.

<sup>167</sup> GOOGLE-01-00019527.



**Figure 6**  
**Depiction of Java Community from Sun Presentation<sup>168</sup>**



157. Google faced a closing window of mobile opportunity to avoid being locked out. The Infringed Java Copyrights provided Google a powerful means of accessing dozens of OEMs and mobile carriers and millions of Java developers that Google desperately needed. Google's internal emails confirmed that the alternatives "all suck"<sup>169</sup> and Android needed access to Java and its developer community<sup>170</sup> and that the Infringed Java Copyrights would attract them to the Android platform.<sup>171</sup>

#### **4.7.2.2 Dr. Leonard Exaggerates the Utilization of NDK and Provides no Support for C/C++ as a Reasonable Alternative**

158. Dr. Leonard mischaracterizes Android NDK as a popular platform that accounts for at least half of Android app development. Android NDK is a toolset that allows a developer "to implement parts of your app using native-code languages such as C and C++."<sup>172</sup> I understand that the NDK is not even encouraged as the Android developers guide states "[T]he NDK is not appropriate for most novice Android programmers, and has little value for many types of Android

<sup>168</sup> GOOGLE-01-00018140 at 143. Incidentally, the cover email dated January 31, 2006 of this document shows that Andy Rubin was in possession of this Sun presentation and indeed asked for the information continued therein.

<sup>169</sup> GOOGLE-12-10000022.

<sup>170</sup> Deposition of Daniel Bornstein, May 16, 2011, p. 47.

<sup>171</sup> Deposition of Daniel Bornstein, May 16, 2011, pp. 47-49.

<sup>172</sup> <http://developer.android.com/tools/sdk/ndk/index.html>.



apps. It is often not worth the additional complexity it inevitably brings to the development process.”<sup>173</sup> In fact, Google actually discourages developers from using NDK outside specific use cases such as game engines, signal processing and physics simulation. Google also states that “the NDK will not benefit most apps” and that using “native code on Android generally does not result in a noticeable performance improvement, but it always increases your app complexity. In general, you should only use the NDK if it is essential to your app – never because you prefer to program in C/C++.”<sup>174</sup>

#### **4.7.2.3 Dr. Leonard Greatly Underestimates the Full Cost to Replace Java-Based Apps in the Google Play Store**

159. Dr. Leonard’s assumption that a \$715 course in a foreign programming language would be sufficient for a Java programmer to build and maintain Android’s most downloaded apps is nonsensical. An oversimplified yet not unreasonable analogy would be a unilingual student taking a single foreign language class, and then assuming the student would be able to create the best-selling works of that language. To develop large scale, complex, and highly used apps typically takes years.<sup>175</sup> Thus, minimizing the effort of learning C/C++ to a single course and cost of \$715, as Dr. Leonard has done, is not reasonable.
160. Dr. Leonard’s assumption that 3,000 developers would replace the collective contribution to the Android Platform of millions of Java developers is also not reasonable. In order to be competitive in the mobile market with companies such as Microsoft, Andy Rubin acknowledged the importance of leveraging “millions” of Java developers in order to meet the critical window of mobile opportunity.<sup>176</sup> To suggest that Android would achieve a similar outcome with a developer community of a few thousand is illogical.
161. In addition to relying on a flawed methodology and assumptions, Dr. Leonard’s actual calculation also appears to be flawed. He estimates that approximately 3,779 developers are responsible for the top 100 downloaded apps on Android for the years 2008 – 2015. After making adjustments for apps written using NDK and those on multiple platforms, he multiplies by 1.6 to account for the number of programmers per app developer. 1.6 programmers per app is likely a drastic understatement. To put this number into perspective, King Digital (recently acquired by Activision Blizzard), a developer of just four of the top 100 apps on Dr. Leonard’s list has 1,600 employees.<sup>177</sup> Many of those employees are developers, which was a key reason Activision acquired King, as they desired mobile expansion.<sup>178</sup> He derives the programmers per app ratio from the Google

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<sup>173</sup> <http://developer.android.com/ndk/guides/index.html>.

<sup>174</sup> <http://developer.android.com/tools/sdk/ndk/index.html>.

<sup>175</sup> <http://www.coderanch.com/t/507541/java/java/long-good-Java>.

<sup>176</sup> Expert Report of Dr. Jaffe, February 8, 2016, ¶ 162.

<sup>177</sup> <https://www.macroaxis.com/invest/ratio/KING--Number-of-Employees>.

<sup>178</sup> <https://fortune.com/2015/11/03/activision-blizzard-king-digital/>.



Developer Challenge in 2008, in which only one of the applications from the Developer Challenge are among the highly rated applications that he listed in Exhibit 2i.<sup>179</sup>

162. Finally, Dr. Leonard's analysis ignores that Android would need hundreds of thousands of apps available to be attractive to developers and consumers. By limiting his analysis to Java-enabled apps in the top 100, he fails to value the hundreds of thousands of other Java-enabled apps available on Google Play. Dr. Leonard is misguided to suggest that replacing the top few hundred apps would still enable Android to be competitive with platforms such as iOS, which today offer over a million apps.

#### **4.7.3 Avoidance of Costs Associated with Paying Third Party Developers to Develop Android Apps**

163. Dr. Leonard estimates the avoided costs associated with paying third party developers to develop the "most used" Android apps in C/C++ is \$23 million to \$100 million. His use of the cost approach and C/C++ as a reasonable alternative is improper for the reasons mentioned above as well as those listed below, which I describe further in the paragraphs that follow:
- Dr. Leonard's analysis is based on a marketing strategy that Google determined didn't work and wasn't considered to be an effective mechanism for app development
  - Dr. Leonard underestimates the full costs of developing a mobile app
  - Dr. Leonard only considers the cost of development for 1,000 apps and ignores the remaining 1.6 million apps currently offered by Google Play

##### **4.7.3.1 Dr. Leonard's Analysis is Based on a Marketing Strategy that Google Determined Didn't Work and Wasn't Considered to be an Effective Mechanism for App Development**

164. Dr. Leonard's analysis partly relies upon testimony from Reto Meier, Developer Relations employee at Google. Mr. Meier testified that Google considered financially incentivizing developers to build Android apps, but did not do it because it was not effective, particularly for big brands (e.g. developers of highly used apps). Specifically, Mr. Meier testified that Google elected not to undertake the plan because "it wasn't considered to be an effective mechanism for incentivizing app development."<sup>180</sup>
165. An October 2010 email between Mr. Meier and several Developer Relations employees at Google explained that incentivizing third party app development was "the regular MO for both MS and Nokia" and that "Microsoft and Nokia are not only funding (and managing) the app development,

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<sup>179</sup> Expert Report of Dr. Leonard, Exhibit 2i, "Free and Paid Apps Appearing on Daily Top 100 Download Lists, June 2015".

<sup>180</sup> Deposition of Reto Meier, December 11, 2015, p. 71.



they're also paying companies above and beyond development costs for the privilege" adding, however, that "such a strategy is not self-sustaining in the long term."<sup>181</sup> In the same email chain, Mr. Meier compared incentivizing third party developers to "throw[ing] some money out the window and see if it comes to something."<sup>182</sup>

#### 4.7.3.2 Dr. Leonard Underestimates the Full Costs of Developing a Mobile App

166. In his testimony, Mr. Meier stated that such a program wasn't compelling to developers and ineffective because it "may have offsetted [sic] the initial upfront development costs, but the long-term, ongoing development maintenance and – support of a product would continue to cost additional resources for the company....there's significant risk that they wouldn't continue to develop, evolve, and ensure that it continued to be a high-quality app would have, in the longer term been a negative for the platform, and, additionally, the offset, in terms of ROI to developers, just wasn't that compelling...If we are talking about big brands, these aren't huge amounts of money, and their interest, from my recollection, was more of a longer-term ROI rather than an initial requirement to be able to offset the initial development."<sup>183</sup>
167. Dr. Leonard ignores the long term costs required to develop and maintain a mobile app and instead basis his calculation only on estimated up front development costs of \$25,000 - \$100,000. Industry experts have indicated that up front development costs are only the "the tip of the iceberg".<sup>184</sup> A November 2014 Kinvey Report based on a survey of CIOs and Mobile Leaders found that mobile app development can be "costly, slow and frustrating" and that for development costs alone "...18 percent say they spend from \$500,000 to over \$1,000,000 per app, with an average of \$270,000 per app."<sup>185</sup> Furthermore, the Google presentation that Dr. Leonard relies upon specifies that up front development costs for games is \$500,000.<sup>186</sup> In 2014, mobile games accounted for approximately 90% of Android's app revenue, however, Dr. Leonard caps his cost-per-app range at \$100,000.<sup>187</sup>
168. Dr. Leonard also incorrectly conflates the up front development cost for average mobile apps with that of the "most used apps". Highly used apps are likely to cost much more to develop and maintain than an average mobile app. The development of apps with millions of users requires the apps to be stable, robust, and tested for quality and failure under numerous test cases. I understand that in any coding process, time for debugging, testing, and ensuring quality usually takes much longer than simple code writing. There are numerous code processes and software quality initiatives that are required to ensure code works under a number of circumstances and test

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<sup>181</sup> Exhibit 5025 to the Deposition of Reto Meier, December 11, 2015, GOOGLE-37-00023782-785 at 783-784.

<sup>182</sup> GOOGLE-37-00023782-785 at 782.

<sup>183</sup> Deposition of Reto Meier, December 11, 2015, p. 72.

<sup>184</sup> <http://www.formotus.com/14018/blog-mobility/figuring-the-costs-of-custom-mobile-business-app-development>.

<sup>185</sup> <http://www.formotus.com/14018/blog-mobility/figuring-the-costs-of-custom-mobile-business-app-development>.

<sup>186</sup> Exhibit 5024 to the Deposition of Reto Meier, December 11, 2015, GOOGLE-03-00007402 at 462.

<sup>187</sup> <http://www.androidauthority.com/app-annie-2015-app-retrospective-668731/>



conditions.<sup>188</sup> It would be unreasonable to suggest that the full costs associated with building and maintaining a highly used app are limited to \$25,000 - \$100,000.

**4.7.3.3 Dr. Leonard Only Considers the Cost of Development for 1,000 Apps and Ignores the Remaining 1.6 Million Apps Currently Offered by Google Play**

169. As with the previous analysis, Dr. Leonard assumes the other large portion of the 1.6 million apps that are Java-based and currently available on Google Play are irrelevant to Google's causally connected profit. By only quantifying the cost to develop 1,000 apps, Dr. Leonard neglects to value the cost to develop the additional hundreds of thousands of Java-based apps available for Android. To assume Android would be equally successful with only a thousand available apps completely ignores the impact of opportunity costs.
170. By applying Dr. Leonard's calculation to the total number of 1.6 million available apps in Google play, rather than the most used apps, approximately 560,000<sup>189</sup> Java-based apps would need to be developed in C/C++.<sup>190</sup> According to Dr. Leonard's average cost of development, that would cost Google \$14 billion to \$56 billion.

**5. RESPONSE TO DR. LEONARD'S LOST PROFIT OPINIONS**

171. As stated previously, in spite of the rebuttal opinions put forth in the Leonard Report, the opinions expressed in my Initial Report regarding Oracle's lost profits remain unchanged. In response to the opinions put forth by Dr. Leonard and as further support for the opinions reflected in my Initial Report, I note the following:

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<sup>188</sup> <https://www.atlassian.com/landing/software-testing/>.

<sup>189</sup> Determined by using Dr. Leonard's estimate of 35% of Java based apps times 1.6 million available apps on Google Play.

<sup>190</sup> <http://www.statista.com/statistics/276623/number-of-apps-available-in-leading-app-stores/>; Expert Report of Dr. Leonard, February 8, 2016, footnote 277. 1.6 million apps in Google Play store x 35% of Google Play apps that are non-Google apps, non-C++ apps, or apps not by multi-homing developers = 560,000.



- Dr. Leonard's zero lost profits opinion is unreasonable and inconsistent with the evidence
- Dr. Leonard's alternative lost profit opinions are speculative and unreliable
- Dr. Leonard inappropriately compares lost profits to Sun/Google negotiations
- Dr. Leonard improperly considers Java to be "stagnant"
- Dr. Leonard overstates the impact of the recession on the mobile industry
- Dr. Leonard fails to account for Sun's dominance among carriers and OEMs (for example) in the feature phone market
- Dr. Leonard fails to consider Sun's ability to transition its dominance into the smartphone market
- Dr. Leonard does not address Sun's relationship with Nokia

### 5.1 Dr. Leonard's Zero Lost Profits Opinion is Unreasonable and Inconsistent with the Evidence

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172. Dr. Leonard opines that Oracle's lost profits are "zero" and that Google's infringement of the Java Copyrights did not result in the decline in Java ME revenue.<sup>191</sup> However, Dr. Leonard's opinions fail to consider important facts and circumstances that render an opinion of zero lost profits unreasonable. The information presented in my Initial Report, and further detailed in this responsive report, provide strong support for my opinion that Google's infringement of the Java Copyrights caused Sun, now Oracle, to lose profits. Not only did Google's illegal use of the Infringed Java Copyrights negatively impact Sun and Oracle's ability to enforce and renew Java ME licenses, it also adversely impacted Sun's ability to capitalize on the emerging smartphone market.
173. To arrive at a zero lost profits opinion, Dr. Leonard ignores evidence that directly relates to lost Java ME license revenue as a result of Android.<sup>192</sup> For example, it was evident to Sun/Oracle that as early as 2010, carriers including Sprint, Verizon, AT&T and T-Mobile were decreasing their investments in Java ME and instead making "heavy investment[s] in Android."<sup>193</sup> An internal Sun presentation created in FY 2010 predicted that "Android will eliminate >\$45M (50%) of Java ME revenue in next 18 months."<sup>194</sup> Similarly, Henrik Stahl testified:

*Q: Have Oracle's Java ME revenues declined in the last five years?*

*A: Yes, without a doubt, yes. <sup>195</sup>*

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<sup>191</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 11.

<sup>192</sup> OAGOOGL0000799926.

<sup>193</sup> OAGOOGL0000799926.

<sup>194</sup> OAGOOGL0000457616-617 at 617.

<sup>195</sup> Deposition of Henrik Stahl, January 14, 2016, pp. 162-164.



He went on to testify: “That [Java ME] revenue source pretty much started disappearing when Android upset the kind of Java-based phone market, if you will.”<sup>196</sup>

174. In an attempt to discredit my Java ME lost profits analysis and thus provide support for his zero lost profits opinion, Dr. Leonard improperly suggests that my lost profits opinion is overstated because the losses per Android device profit is higher in earlier years than it is in later years.<sup>197</sup> This opinion is fundamentally flawed as it suggests Sun’s losses in the early years would immediately tie to phone sales. Once Android was chosen by OEM’s/carriers there would be a delay as to when the Android phones would enter the market. Dr. Leonard’s per-unit calculation also inappropriately suggests that the relationship between Android units and lost Java ME profits should be linear throughout the entire damages period. However, Android does not have a static relationship with Java ME whereby a unit of Android on the market causes a specific level of Java ME lost profits. Sun lost entire business relationships, it lost the opportunity to compete in the smartphone space, and it lost the ability to significantly monetize Java through its historic licensing model.
175. Dr. Leonard also incorrectly argues that a decline in the amount of Java ME revenue per feature phone suggests that Android did not cause Java ME lost profits.<sup>198</sup> He reasons that, since Oracle was unable to earn consistent Java ME revenue per feature phone, a decline in Java ME could not be the result of Google’s infringement because Android does not compete with feature phones.<sup>199</sup> First, Android does in fact compete with feature phones.<sup>200</sup> Even if Android were used predominantly on smartphones, it is incorrect to assume that it does not compete with other mobile devices, as Dr. Leonard suggests. Rather Android entered the market and gained rapid success precisely because it was able to successfully and effectively compete with existing technology on the market, including feature phones. Furthermore, feature phones and smartphones are not entirely distinct from one another as the functionality exists on a continuum, and feature phones continue to dominate the international mobile device market.<sup>201</sup> Dr. Leonard’s opinions in this regard are further flawed, given my understanding that Android has been used on feature phones.<sup>202</sup> Dr. Leonard also ignores Sun’s attempts to transition from feature phones to smartphones as evidenced by its acquisition of SavaJe in 2007.<sup>203</sup> Sun described SavaJe as a “highly customizable, integratable phone solution centered on Java” that would “strongly contribute to

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<sup>196</sup> Deposition of Henrik Stahl, January 14, 2016, pp. 162-164.

<sup>197</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 136. Exhibits 4a and 4b to the Expert Report of Dr. Leonard, February 8, 2016.

<sup>198</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 136-137.

<sup>199</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 136-137.

<sup>200</sup> <http://www.cnet.com/news/android-and-the-future-of-feature-phones/>.

<sup>201</sup> <http://www.philstar.com:8080/telecoms/2013/04/06/927330/asha-blurring-lines-between-feature-phones-smartphones>; <http://qz.com/418769/theres-still-plenty-of-money-in-dumb-phones/>.

<sup>202</sup> <http://www.cnet.com/news/android-and-the-future-of-feature-phones/>.

<sup>203</sup> OAGOOGL00006231006-033 at 025; OAGOOGL0000473609-612; OAGOOGL0000424812-813 at 812.



Sun's future competitive position in the mobile technology market.”<sup>204</sup> Thus, Dr. Leonard's opinion that Google's infringement has not impacted the feature phone market and corresponding Java ME revenue is unreliable in that it lacks consideration of the overall market in which Android participates.

176. Dr. Leonard also improperly critiques my consideration of an alternate Java ME forecast from an October 2008 Sun presentation, “Java in Wireless Business Review.”<sup>205</sup> To clarify, I did not offer an alternate lost profits opinion based on the “Best Estimate” forecast found in this presentation. Rather, I reviewed the “Best Estimate” forecast to confirm the reasonableness of the growth rate assumption in my Java ME lost profits calculation. In critiquing my reference to the “Best Estimate,” Dr. Leonard believes “there is no need to calculate and use a 2009 to 2010 growth rate” since there were forecasted revenues available for 2009-2012.<sup>206</sup> However, what Dr. Leonard fails to consider is that forecasts included in this document are encumbered by the existence of Android, and therefore do not represent an accurate picture of Sun's marketplace opportunities - absent the impact of Android in the “but-for” world. To that point, I note the “Best Estimate” forecast specifically states that one of the assumptions employed was that there would be “[no] drastic blow to business model in FY09.”<sup>207</sup> I also note that all four of the projections included in the presentation reflect the negative effect of Android on Java ME revenue, to varying degrees. Since Sun was aware that the impact of Android would result in losses once its licenses transitioned to Android, it projected greater losses for 2010-2012 (when licenses began coming up for renewal). This understanding is consistent with Sun's projection of growth in 2009 and 2010, and a decline thereafter. Therefore, while I reviewed this document to determine that my chosen growth rate was lower than the growth rate of a model that reflected the impact of Google's infringement, I did not endorse this model as a basis for the determination of lost profits.
177. Despite Dr. Leonard's improper use of the “Best Estimate,” he relies on the document to perform two alternate lost profit calculations.<sup>208</sup> Both of those calculations are unreliable because they rely on an Android tainted source document, and it is not possible to capture the losses attributable to Android when you start with a projection that has already been reduced by the impact of Android.

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<sup>204</sup> OAGOOGL00006231006-033 at 025; OAGOOGL0000473609-612; OAGOOGL0000424812-813 at 812.

<sup>205</sup> OAGOOGL0000142142; Expert Report of Dr. Leonard, February 8, 2016, pp. 137-138.

<sup>206</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 138.

<sup>207</sup> OAGOOGL0000142142 at slide 28.

<sup>208</sup> It is unclear why Dr. Leonard proposes a calculation which limits damages to only CLDC. I am aware that there was an order issued by the Court on February 5, 2016 in which the Court limited the case to exclude new Android lines of business that did not exist at the time of the initial trial. This order does not impact my determination of lost profits in this case because it relies on Java's historical businesses. Similarly, I primarily rely on the same documents and methods employed by the experts at the time of the initial trial and have not altered the assumptions made to reflect Android's new products which the Court addressed in its order.



## 5.2 Dr. Leonard's Alternative Lost Profits Opinions Are Speculative and Unreliable

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178. Despite claiming Oracle's lost profits are zero, Dr. Leonard puts forth two alternative Java ME lost profit calculations.<sup>209</sup> My comments regarding Dr. Leonard's alternative calculations are detailed throughout this section, and can be summarized as follows:
- The underlying basis for Dr. Leonard's calculation is improper
  - Dr. Leonard's reconstructed market is speculative
  - Dr. Leonard's conversion of market share to "revenue capture" is misleading
  - Dr. Leonard's diversion ratio is unfounded and misleading
179. Dr. Leonard states he "adjusted Mr. Malackowski's calculation by starting with Oracle's actual Java ME licensing revenues, and asking what effect Android had on those revenues under conservative assumptions..."<sup>210</sup> However, Dr. Leonard does not "adjust" my analysis. Rather, he performs an entirely different analysis that suffers from several deficiencies.
180. First, Dr. Leonard's starting point of Oracle's actual Java ME licensing revenues is inappropriate because the revenues he relies on are already reduced due to Google's illegal use of the Infringed Java Copyrights. Thus, by basing his alternative lost profit calculations on an already reduced revenue stream, Dr. Leonard's analysis significantly understates Sun's losses.
181. Next, Dr. Leonard calculates the "potential Java ME licensed handsets" by creating a "but-for" market whereby Sun's market share is recalculated to incorporate infringing units absent infringement. Such an approach – typically referred to as a "Mor-Flo" analysis in connection with patent infringement actions – is inappropriate in this copyright infringement matter as it requires recreating an emerging smartphone market, absent Google's infringement. Given the transformation of the mobile industry throughout the damages period, any attempt to recreate the market absent Android's infringement would be highly speculative. In fact, since Android was released at the same time as the smartphone shift, there does not exist an accurate representation of the smartphone market absent Android's infringing impacts.
182. Dr. Leonard next deducts Android units to arrive at "non-Android handsets," before reducing that amount by the number of iPhone units to arrive at "Potential Java ME Licensed Handsets".<sup>211</sup> Without expressly saying so, by removing iPhone units Dr. Leonard's analysis implicitly assumes iOS would be the only economic substitute for Android through 2015. Such an assumption fails to consider the potential that an additional competitor such as RIM, Nokia, Microsoft and/or Sun could have emerged in Android's absence. This speculative assumption runs contrary to factual evidence showing RIM, Nokia, Microsoft and Sun as market leaders prior to the introduction of Android. It is also improperly suggesting that numerous third parties that are now associated with

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<sup>209</sup> Expert Report of Dr. Leonard, February 8, 2016, pp. 139-140.

<sup>210</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 139.

<sup>211</sup> Exhibit 4f to the Expert Report of Dr. Leonard, February 8, 2016.



Android (e.g. OEMs, app developers, etc.) would not have been ready, willing and able to align with a (non-Android) provider of a non-iOS mobile platform.

183. In addition to these flaws in Dr. Leonard's "potential Java ME licensed handsets" calculations, reviewing the next steps in his lost profits analysis reveals additional flaws. Dr. Leonard subsequently uses the previously discussed calculations to determine the "Potential Java ME Market Share" by dividing the "Potential Java ME Licensed Handsets" (which improperly exclude iPhone units as discussed previously) by "Non-Android Handsets".<sup>212</sup> Rather than using Sun's actual market share and extrapolating the additional units it would have captured in the "but-for" world as is typically done in Mor-Flo analyses, Dr. Leonard improperly recalculates an alternative market share. In doing so, Dr. Leonard ignores the possibility that Sun could have maintained its market dominance, as prior to the introduction of Android, Java ME was enabled on 80 percent of worldwide handsets.<sup>213</sup>
184. Next, Dr. Leonard determines a "but-for Java ME Revenue Capture Rate" by multiplying the "Potential Java ME Market Share" by "Android Handsets" and dividing the product by the "Potential Java ME Licensed Handsets".<sup>214</sup> This calculation is not a revenue capture rate, despite Dr. Leonard calling it that. In fact, this is the additional unit market share of what Dr. Leonard believes are the total possible Java ME units. Applying this unit market share increase to Java's damaged actual revenues, is meaningless, because they do not represent or reflect that value of total possible Java ME units. Therefore, he has misapplied his so called "revenue capture rate" to an inappropriate revenue stream rendering the results meaningless.
185. I note, Dr. Leonard does not alter my approach to incremental expenses. In fact, he does not discuss incremental expenses aside from deducting them in his lost profits calculations. The calculations described above result in Dr. Leonard's opinion that Java ME lost profits equal \$128.5 million<sup>215</sup>
186. In addition to his \$128.5 million lost profits analysis, Dr. Leonard offers a second alternative calculation of Java ME lost profits. This second approach begins with the same methodology as his first alternative, but Dr. Leonard performs an additional iPhone based adjustment to the "but-for" market based on what he refers to as a "diversion ratio." The result of Dr. Leonard's second alternative calculation is \$85.7 million,<sup>216</sup> and my comments regarding the "diversion ratio" upon which Dr. Leonard has inappropriately relied to perform his second alternative calculation are detailed in Sections 4.2-.4.4 of this report.

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<sup>212</sup> Exhibit 4f to the Expert Report of Dr. Leonard, February 8, 2016.

<sup>213</sup> Exhibit 1390 to Deposition of Alan Brenner, OAGOOGL0013561757-786 at 759.

<sup>214</sup> Exhibit 4f to the Expert Report of Dr. Leonard, February 8, 2016.

<sup>215</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 140; Exhibit 4e and 4f to the Expert Report of Dr. Leonard, February 8, 2016.

<sup>216</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 140.



### 5.3 Dr. Leonard Improperly Compares Lost Profits to Sun/Google Negotiations

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187. Dr. Leonard inappropriately states his alternative lost profit calculations are “more consistent with both Sun’s initial proposal to Google, and the parties’ final negotiating positions, during the Sun-Google negotiations in 2005 and 2006 regarding a possible collaboration between the two companies to develop a Java-language based mobile platform”.<sup>217</sup> Using offers made in an unsuccessful negotiation to support a lost profits opinion is inappropriate. A major aspect of the negotiations was Sun’s insistence that Google use a compliant version of Java such that Sun would be able to continue to expand and grow its Java business. Thus, a major reason the negotiations failed is because the parties could not agree on this issue, or on the appropriate level of compensation for a Google intended non-compliant use of Java.

### 5.4 Java Was Not Stagnant When Google Chose to Adopt it for Use with Android and it is Not Stagnant Now

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188. Dr. Leonard claims Java was stagnant prior to the introduction of Android and that Java ME revenue declined as a result of this ongoing problem, and not due to Google’s infringement of the Java Copyrights. However, Dr. Leonard’s opinion ignores that, at the time of Google’s first infringement of the Java Copyrights, Java was the leading applications platform and its developer community was continuing to grow. In 2006, Sun was on the “leading edge” and had the largest mobile developer community in the market by “a couple orders of magnitude.”<sup>218</sup> As discussed in my Initial Report, in 2006 there were six million Java developers and by 2010 the Java development community had grown to nine million members.<sup>219</sup> With regard to Java enabled phones specifically, as of May 2009, Java enabled over 2.6 billion phones worldwide.<sup>220</sup> This grew to 3 billion Java enabled mobile phones by 2010.<sup>221</sup> Had Java been “stagnant,” as Dr. Leonard alleges, it is unlikely that the number of Java developers and Java enabled phones would have grown by such amounts over those time periods. Furthermore, as seen in the following Figure 7, over the period 2002 – 2016, Java’s developer community rating has consistently remained ahead of most, if not all, of its competition.

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<sup>217</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 141.

<sup>218</sup> Deposition of Alan Brenner, December 15, 2015, pp. 75-76.

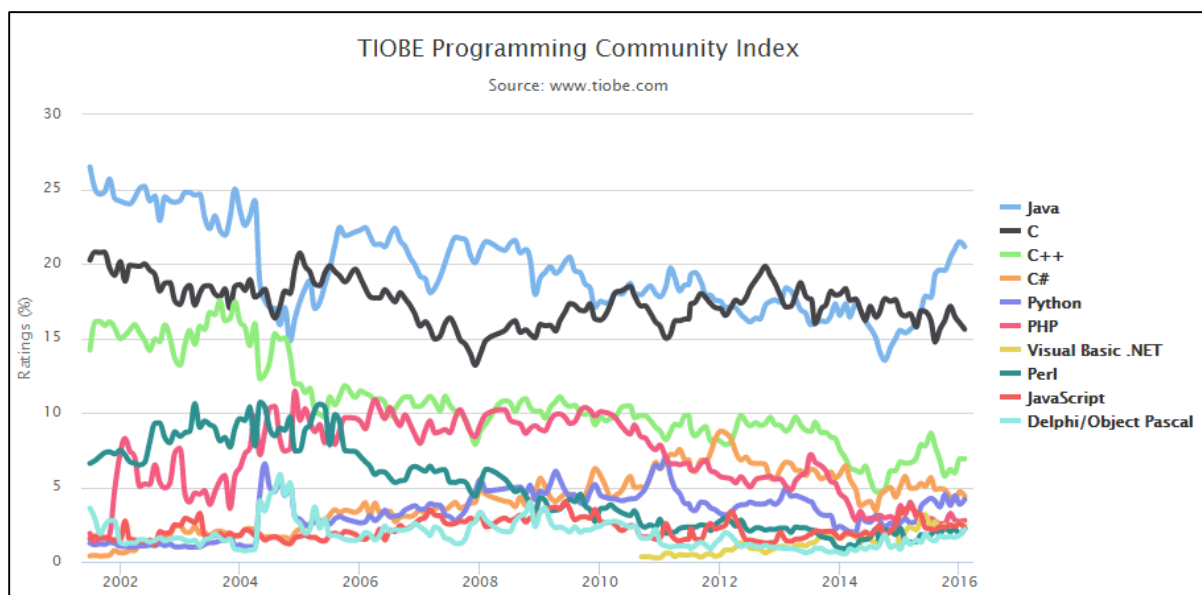
<sup>219</sup> OAGOOGL0013122655-718 at 656.

<sup>220</sup> OAGOOGL0000061924-2030 at 1954.

<sup>221</sup> OAGOOGL0013122655-718 at 662.



**Figure 7**  
**Historical Summary of Java Programming Community Ratings** <sup>222</sup>



189. Google's use of Java in Android further supports an assertion that Java ME revenue did not decline due to lack of Java viability for a mobile platform. In a January 2006 internal Google email chain, Mr. Brian Swetland stated: "Java is more accessible than C++. There are more Java programmers. There is more standardization in tools and libraries. Debugging is much simpler."<sup>223</sup> Additionally, Mr. Rubin stated in an email in April 2006 that: "We will ship a more stable product sooner if we do as much as possible in Java."<sup>224</sup> In a March 2006 Google Monetization Proposal to Sun, Google states "Our goal is to create a branded open handset platform which has an implied conformant level of functionality and APIs...Sun could play a significant role in that conformance and branding process."<sup>225</sup> Similarly, in a November 2006 Google presentation to T-Mobile regarding its wireless partnership, Google stated: "Supporting Java [ME] is the best way to harness developers...Linux fragmentation threatens market acceptance. Tools and new app frameworks are biggest hurdles. 6M Java developers worldwide. Tools and documentation exist to support app development without the need to create a large developer services organization. There exist many legacy Java applications. The wireless industry has adopted Java, and the carriers require its support."<sup>226</sup>

<sup>222</sup> <http://www.tiobe.com/index.php/content/paperinfo/tpci/index.html>

<sup>223</sup> GOOGLE-01-00019511-513 at 512.

<sup>224</sup> GOOGLE-01-00075935-936 at 935.

<sup>225</sup> Trial Exhibit 11, p. 4.

<sup>226</sup> Trial Exhibit 387, p. 40



190. In addition to Dr. Leonard's misguided assertion that Java was stagnant, he also inappropriately points to "security problems" with Java.<sup>227</sup> Much of the support for this inappropriate assertion relates to desktop computers and issues in the 2012 to 2013 time frame.<sup>228</sup> While this time frame is years after the infringement began, Dr. Leonard neglects to discuss the security issues with Android itself and the vulnerabilities across many programming languages.<sup>229</sup> There is no evidence that security issues were any different in the "but for" vs. actual world and therefore would not be the cause of the shortfall in the actual world.
191. Dr. Leonard also improperly argues Sun's licensing practices caused "the Java Platform to be fragmented"<sup>230</sup>, however this assertion disregards Sun's attempts to maintain control of Java and the continued success of the platform. Dr. Leonard improperly states that Sun's TCK left room for incompatibility, when in fact part of the reason for implementing the TCK was to reduce fragmentation.<sup>231</sup> Dr. Leonard also asserts Sun's license with DoCoMo "is a good example of how it created fragmentation"<sup>232</sup> however his only citation for this argument is a reference to a conversation with John Rizzo. Thus Dr. Leonard inappropriately makes this assertion without even citing the actual license agreement, or any other evidence in this matter. Moreover, DoCoMo's implementation of Java was never intended to be separate or incompatible: it was viewed as the "best interim solution" by DoCoMo until MIDP had evolved enough to meet the enhanced performance specifications that DoCoMo needed for its handsets.<sup>233</sup> Email correspondence between Sun and DoCoMo indicate that both sides were actively engaged in discussions on how to converge development.<sup>234</sup>

## 5.5 The Limited Impact of the Recession on the Mobile Phone Industry

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192. Dr. Leonard opines that the financial crisis of 2008 "was a cause of the failure of JavaFX Mobile as well as a decline in Sun's revenues generally, likely was another contributory factor to the decrease in Java ME licensing revenues that had nothing to do with Android."<sup>235</sup> To support this opinion, Dr. Leonard looks to Sun's Systems Group, (which consists of "Server Products" and "Storage Products" and Java licensing revenues) which experienced a decrease in revenue of -1.7% in FY 2008 and -22.2% in FY 2009.<sup>236</sup> However, Dr. Leonard does not link the declining Systems Group revenue directly to Java ME beyond simply noting that Java ME is reported under Sun's Systems

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<sup>227</sup> Expert Report of Dr. Leonard, February 8, 2016, pp. 125-128.

<sup>228</sup> Expert Report of Dr. Leonard, February 8, 2016, pp. 125-128. <http://arstechnica.com/security/2013/01/critical-java-vulnerabilities-confirmed-in-latest-version/>.

<sup>229</sup> <http://www.zdnet.com/article/android-you-have-serious-security-problems/>.

<sup>230</sup> Expert Report of Dr. Leonard, February 8, 2016, pp. 107-111.

<sup>231</sup> Deposition of Vineet Gupta, July 26, 2011, pp. 175-179.

<sup>232</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 109.

<sup>233</sup> OAGOOGL0017187388.

<sup>234</sup> OAGOOGL0012956691-693 at 692 -693.

<sup>235</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 124.

<sup>236</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 124.



Group. Comparing Java ME revenue to the total revenue for the Systems Group reported in the annual report, Dr. Leonard indicates that Java ME revenue represented 1.15% of Sun's Systems Group in 2008 and 1.46% in 2009.<sup>237</sup> As evidenced by these calculations, Java ME is a small portion of the Systems Group and thus the overall Systems Group financial performance is not representative of Java ME specifically. Furthermore, in its 2009 Form 10-K, Sun attributed the decline in its Systems Group to "the weakness in demand for high-end servers" and "aggressive discounting with respect to our tape and enterprise disc array products."<sup>238</sup>

193. Although certain aspects of Sun's business declined as a result of the recession, it should be noted that a material portion of Sun's revenue was generated through the sale of servers, primarily to large financial institutions. In 2009, more than 25% of Sun's overall revenue resulted from the sale of servers<sup>239</sup> and, because many large financial institutions were negatively impacted by the financial crisis, Sun's sales of servers declined rapidly.<sup>240</sup> As a result of the financial crisis, Sun re-organized its software business group in addition to cutting costs in hopes of improving its profit margins.<sup>241</sup> Notably, Sun's 2009 Form 10-K also describes the introduction of the JavaFX Mobile Platform as one of the "cornerstones of [our] business strategy."<sup>242</sup>
194. While the financial crisis significantly impacted the economy, consumers' growing use of mobile data on increasingly complex mobile devices set the stage for the mobile industry, and Sun's related business, to minimize the impact of the recession. This is reflected in the following excerpts taken from analyst reports:
  - The Economist stated: *"Despite the recession, the mobile industry is enjoying a promising transformation."*<sup>243</sup>
  - Infonetics Research stated: *Bucking the general trend, smartphones are expected to out-perform the downturn and show modest growth in 2009, and will be the only mobile phone segment to maintain annual revenue growth over the next five years, and the only to post double-digit annual revenue growth from 2011 to 2013."*<sup>244</sup>

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<sup>237</sup> OAGOOGL0100167800; Sun Microsystems, 2009 Annual Report, June 30, 2009, p. 90.

<sup>238</sup> Sun Microsystems, 2009 Annual Report, June 30, 2009, p. 48.

<sup>239</sup> <http://www.sec.gov/Archives/edgar/data/709519/000119312509183969/dex992.htm>;  
<http://www.nytimes.com/2008/10/31/technology/companies/31sun.html>.

<sup>240</sup> [http://www.forbes.com/2008/10/20/sun-earnings-loss-tech-enter-cx\\_ag\\_1020sun.html](http://www.forbes.com/2008/10/20/sun-earnings-loss-tech-enter-cx_ag_1020sun.html);  
<http://www.eweek.com/c/a/IT-Infrastructure/Sun-Microsystems-Fujitsu-Rolling-out-New-SPARCbased-Server-System>;  
<http://www.cnn.com/2008/TECH/10/20/sun.earnings.loss.tech.enter.cx.ag.1020sun.html>;  
[http://www.nbcnews.com/id/27716152/ns/business-us\\_business/t/sun-microsystems-cut-workers/#.VqVrH\\_krLIU](http://www.nbcnews.com/id/27716152/ns/business-us_business/t/sun-microsystems-cut-workers/#.VqVrH_krLIU).

<sup>241</sup> [http://www.nbcnews.com/id/27716152/ns/business-us\\_business/t/sun-microsystems-cut-workers/#.VqVrH\\_krLIU](http://www.nbcnews.com/id/27716152/ns/business-us_business/t/sun-microsystems-cut-workers/#.VqVrH_krLIU).

<sup>242</sup> Sun Microsystems, 2009 Annual Report, June 30, 2009, p. 6.

<sup>243</sup> "Boom in the Bust," March 5, 2009, [www.economist.com/node/13234981](http://www.economist.com/node/13234981).

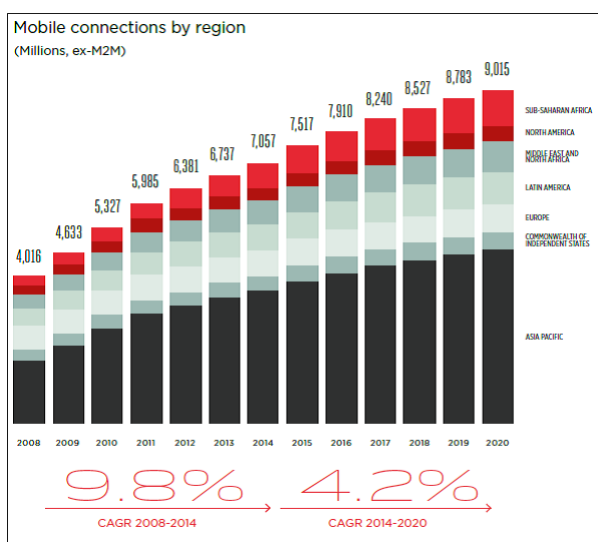
<sup>244</sup> "Smartphone sales buck the recession," March 26, 2009, Infonetics Research,  
<http://www.infonetics.com/pr/2009/2h08-mobile-wifi-phones-market-research-highlights.asp>



- Online research company Mobile Marketer, a self-proclaimed news leader in mobile marketing, media and commerce stated: *“While the failing economy has started to hit hard on the wireless data ecosystem, especially the infrastructure and handsets segments, consumers haven’t really pulled back on mobile data spending overall, just yet.”*<sup>245</sup>

195. As further evidence of the contrary nature of the mobile industry, the number of mobile device internet users grew 37.4 percent from 2011 to 2012.<sup>246</sup> Furthermore, as seen in the following Figure, the number of mobile connections continued to increase throughout the duration of the recession.

**Figure 8**  
**Historical Summary of Mobile Connections by Region**<sup>247</sup>



196. Along with the growing number of internet capable devices and mobile connections, the corresponding number of data subscribers grew during the same time period. Despite the effects of the recession on consumer spending, from 2008 to 2014, the number of mobile data subscribers grew at a compound annual growth rate of 7.6 percent and “data access including flat rate data plan subscriptions has also shown significant strength.”<sup>248</sup> What’s more, as seen in the following Figure, an October 2009 Sun presentation, titled “Mobile All-Hands” highlighted increasing growth in data use by detailing major service provider data subscriber revenue growth from 2008-2009.<sup>249</sup>

<sup>245</sup> “Is Recession Positively Impacting the Wireless Industry,” March 3, 2009, [www.mobilemarketer.com](http://www.mobilemarketer.com).

<sup>246</sup> “Smartphone Users Worldwide Will Total 1.75 Billion in 2014,” January 16, 2014, [www.emarketer.com](http://www.emarketer.com).

<sup>247</sup> “The Mobile Economy,” 2015, GSMA, [www.gsma.com](http://www.gsma.com).

<sup>248</sup> “The Mobile Economy,” 2015, GSMA, [www.gsma.com](http://www.gsma.com); “Is Recession Positively Impacting the Wireless Industry,” March 3, 2009, <http://www.mobilemarketer.com/cms/news/research/2748.print>.

<sup>249</sup> OAGOOGL0000491596-643 at 610.



Figure 9

Growth in Mobile Data Usage During the 2008 – 2009 Time Period <sup>250</sup>

197. In response to increases in mobile connectivity, developers were actively providing content and services to the expanding user base. As discussed previously, the number of Java developers increased to nine million in 2010 from six million in 2007 and the number of Java enabled phones grew from 2.6 billion in 2009 to over 3 billion in 2010. This growth occurred throughout the recession.
198. At the time of the recession, Sun was more concerned about the impact of Android than the impact of the declining economic environment. An April 2009 Sun email chain that stated a: “Need to get ‘Sundroid’ (our answer to Android) out ASAP to have a hope of capturing Java revenue from people going to Android... We get no Java revenue from Android.”<sup>251</sup> It went on to state: “Need App store, and a big focus on content for the App store, plus Service Providers adopting the Sun App store, to continue to monetize Java in handsets where clients are free (Google Android...).”<sup>252</sup> Additionally, in a summary of the reasons for a decline in Java ME revenue in 2011, Sun listed its licensee’s transitions to Android, but made no mention of the overall economy.<sup>253</sup>

<sup>250</sup> OAGOOGL0000491596-643 at 610.

<sup>251</sup> OAGOOGL0000401814-817 at 816.

<sup>252</sup> OAGOOGL0000401814-817 at 816.

<sup>253</sup> OAGOOGL0000725014.



199. Finally, I note that, following Oracle's acquisition of Sun, which was announced 2009 and closed in 2010, Mr. Larry Ellison confirmed the value of Java, despite the ongoing financial crisis, when he stated Java is "the single most important software asset we have ever acquired."<sup>254</sup>

## 5.6 Sun's Dominance of the Feature Phone Market

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200. The decline in Java ME licensing revenue was not a result of the increase in smartphones, as Dr. Leonard suggests. At the time of Google's first infringement, feature phones dominated the international market and Java was enabled on the majority of such devices. Additionally, there was not a specific distinction between feature and smart phones, as discussed by Mr. Alan Brenner in his deposition:

*I looked at the market as a continuum of capabilities. Some phones were generally smarter than others. There wasn't a hard distinction between those two categories in reality.*<sup>255</sup>

201. And Java ME licenses specified "mobile devices" as fields of use and did not distinguish between feature phones and smart phones. For instance, the field of use specified in Sun's 2006 license agreement with Nokia is shown below<sup>256</sup>:

*I. Mobile Devices*

*a. refers to personal, portable computing devices and personal, portable communication devices, and accessories thereto, which are used with or without network access for (i) communication, (ii) access, creation, exchange, storage, output of data or content, and/or (iii) execution of or interaction with applications. Specific examples include mobile handsets and PDAs; and*

*[b]. any software targeted to run in Mobile Device(s) listed in a above, including without limitation downloadable APIs; and*

*c. any software including but not limited to mobile device administration software, for which the primary purpose is to directly support Mobile Devices, and where the use of the Technology does not provide significant value-add to non-mobile enterprise class servers and network elements*

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<sup>254</sup> "Oracle Snatches Sun, Foiling IBM," April 21, 2009, The Wall Street Journal," <http://www.wsj.com/articles/SB124022726514434703>.

<sup>255</sup> Deposition of Alan Brenner, December 15, 2015, pp. 67-68.

<sup>256</sup> OAGOOGL2000181111 at 136.



*(such as switches, exchanges, and network management systems) for telecom, datacom and broadcasting networks. For the avoidance of doubt, Java Enterprise Edition software is specifically excluded;*

202. Cost and the availability of stable data connections and power sources drive consumer preferences for feature phones, which remain prevalent in countries such as India and China where consumers demand phones that provide mobile internet access.<sup>257</sup> Over time, feature phones have provided for enhanced functionality and, by way of example, “It wasn’t long ago that only about 2% of all feature phones could access the web. Now that figure is more like 25%... In other words, billions of people the world over are going to start accessing the web through their feature phones.”<sup>258</sup>
203. Sun licensed Java for use in 90 percent of the feature phone industry.<sup>259</sup> As late as July 23, 2013:

*The biggest opportunity right now isn’t in smartphones, where users are bombarded by the fruits of and ever more competitive market for apps and mobile services. Rather, the play for some companies, especially any that wish to expand into emerging markets, is on the ‘dumbphones’ – aka non smartphones, or in industry parlance, feature phones – that most people in rich countries have now left behind.*<sup>260</sup>

204. Facebook’s actions in 2013 were also consistent with strong demand for feature phones. This is evidenced by its Facebook for Every Phone program which “allows people with data plans on their feature phones to have smartphone-like experiences while using Facebook – meaning they get images, updates, chat, the whole thing.”<sup>261</sup>
205. Even if the shift to smartphones had an impact on Java ME, the shift was accelerated through Google’s release of Android. Google’s infringement and release of Android for free accelerated the move of Java’s customers to smartphones and have had a detrimental impact on Oracle’s business. Dr. Leonard ignores that the very circumstances he points to were often caused by Google’s infringement.

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<sup>257</sup> “Why did everyone abandon the feature phone market?” April 1, 2014, Emerging UX, <http://emergingux.com/why-did-everyone-abandon-the-feature-phone-market/>.

<sup>258</sup> “The biggest opportunity in mobile right now isn’t on smartphones,” July 23, 2013, Quartz, <http://qz.com/106979/the-biggest-opportunity-in-mobile-right-now-isnt-on-smartphones/>.

<sup>259</sup> Deposition of Alan Brenner, December 15, 2015, pp. 150-152.

<sup>260</sup> “The biggest opportunity in mobile right now isn’t on smartphones,” July 23, 2013, Quartz, <http://qz.com/106979/the-biggest-opportunity-in-mobile-right-now-isnt-on-smartphones/>.

<sup>261</sup> “The biggest opportunity in mobile right now isn’t on smartphones,” July 23, 2013, Quartz, <http://qz.com/106979/the-biggest-opportunity-in-mobile-right-now-isnt-on-smartphones/>.



## 5.7 Sun's Ability to Transition Into the Smartphone Market

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206. Dr. Leonard wrongly asserts that Sun's smartphone operating system plans were terminated prior to the launch of Android and thus Android did not cause lost profits.<sup>262</sup> Dr. Leonard's opinion that Oracle's failure to build a smartphone operating system is due to factors other than Android overlooks the impact that Android had on Oracle's decision not to continue with Sun's plans to develop a smartphone operating system.<sup>263</sup> For example, Larry Ellison testified to the barrier to entry Android created for a Java smartphone: "[i]t's very hard to go out and compete against our own IP when someone else is giving that IP away for free."<sup>264</sup>
207. Aside from Java's feature phone market dominance, certain smartphones were also Java-enabled. For example, Sun licensed the Java platform for use in all Blackberry smartphones and the Nokia Communicator and Series 60 devices, which were not only considered smartphones but, at the time, were some of (if not the) most advanced devices on the market. In 2006, around the time of Google's first use of the Infringed Java Copyrights, Nokia and Blackberry were the biggest smartphone providers and Java was used in all of their respective devices.<sup>265</sup> Moreover, the Savaje technology acquired by Sun was also used in smartphones.<sup>266</sup>
208. As seen in the following Figure, shipments of smartphones first exceed feature phones in 2015, almost 10 years after Google's first use of the Infringed Java Copyrights. This shift was in part due to Google's Android, as it provided a lower cost option to the smartphone market: "The surge in new smartphone users will also create a stage where cheap phones using Firefox OS could begin to gain a foothold in South America, with the vast majority of the rest upgrading from feature phones in developing countries expected to buy an Android phone."<sup>267</sup>

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<sup>262</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 130; OAGOOGL0007622843-845 at 843.

<sup>263</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 132.

<sup>264</sup> Deposition of Larry Ellison, August 12, 2011, pp. 63-64.

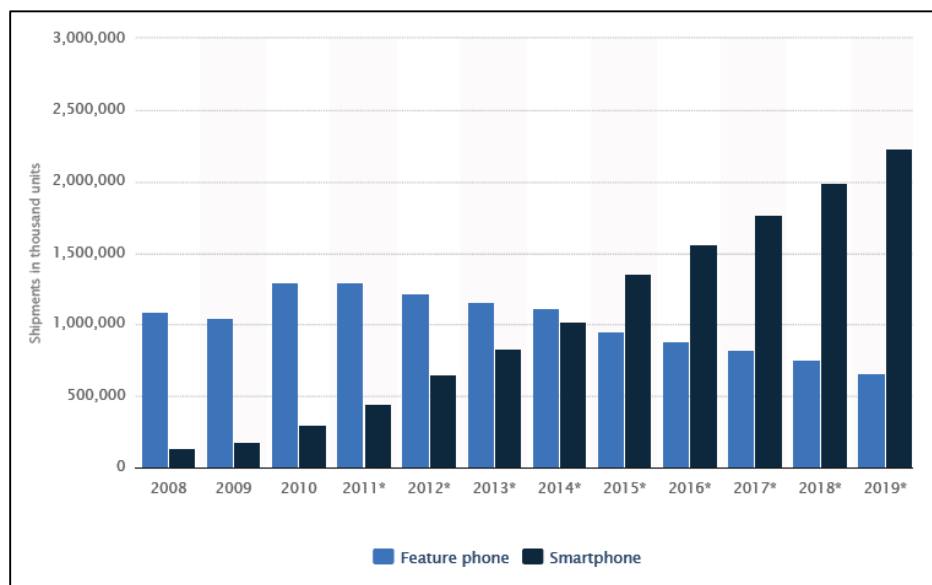
<sup>265</sup> Deposition of Alan Brenner, December 15, 2015, p. 151.

<sup>266</sup> Deposition of Alan Brenner, December 15, 2015, pp. 147-149.

<sup>267</sup> <http://www.theguardian.com/technology/2014/jan/13/smartphone-explosion-2014-india-us-china-firefoxos-android>.



**Figure 10**  
**Summary of Historical Feature Phone and Smartphone Worldwide Shipments** <sup>268</sup>



209. A major reason feature phones remained a large portion of the market is due to their relatively low cost. Therefore, given Sun's dominance in the feature phone market, it was well positioned to capitalize on the opportunity which existed to transition feature phone uses to smartphones, absent Google's infringement.
210. Sun was well aware of the evolving mobile phone market. For example, as early as 2006 Sun recognized the "Need to adjust focus to leverage Developers" and, at that time, was working on project "Sugarloaf," a mobile stack built using Java ME that was in the early stages of becoming a pre-integrated mobile platform.<sup>269</sup> For another example, as discussed in greater detail in my Initial Report, Sun's acquisition of SavaJe was motivated by the opportunity to grow mobile embedded revenue by offering a complete, integrated vertical phone stack that will enable Sun to provide more value to handset manufacturers thus enabling increased per unit device royalties.<sup>270</sup> Also in 2006, desktop developers were expected to look to mobile devices. Therefore, Sun was focused on leveraging Java with developers, as mobile devices continued to become more like desktops.<sup>271</sup>
211. A September 29, 2006 Sun presentation titled "Java ME: Mobile and Embedded" outlines Sun's understanding of the changing market and its plans to transition its technology to capture more of

<sup>268</sup> "Feature phone and smartphone shipments worldwide from 2008 – 2020," The Statistics Portal, [www.statista.com](http://www.statista.com).

<sup>269</sup> OAGOOGL0013331514 – 564 at 531; OAGOOGL0004936380-436 at 4non-.

<sup>270</sup> OAGOOGL0000337463; OAGOOGL0002304235; OAGOOGL0002304236 – 243 at 237; 242 – 243; OAGOOGL0000361417 – 418 at 417; OAGOOGL0001700059 – 061 at 061.

<sup>271</sup> OAGOOGL0004936380-436 at 428.



the growing segments.<sup>272</sup> Included in Sun's plans was its focus on being the "Advanced Phone Implementation Specialist for 1st and 2nd tier OEMs and to drive developer adoption."<sup>273</sup>

212. Sun continued to recognize the market opportunity in 2007, as handsets were becoming more advanced and higher speed IP networks were becoming available.<sup>274</sup> Java had momentum in June 2007 and it was "aligning resources across Sun to produce a 'whole' product".<sup>275</sup> In 2007, Sun combined its Java ME, Java SE and Java card technologies into a single Client Software Group.<sup>276</sup> Sun also touted its "standardized, well-documented APIs" as developer benefits of its mobile operating system.<sup>277</sup> A "High-level Java ME Roadmap" indicated an expectation of enabling Java for advanced phones in Q4 2007,<sup>278</sup> while other Sun documents estimated a first deployment during Q4 2008.<sup>279</sup> Sun also intended to make its advanced phone implementation backwards compatible with all existing Java ME content.<sup>280</sup> The momentum Sun expected to capitalize on is expressed in the following Figure:

**Figure 11**  
**Sun Presentation Reflecting Java Penetration <sup>281</sup>**



<sup>272</sup> OAGOOGL0011726508-539 at 514 -516.

<sup>273</sup> OAGOOGL0013561757-786 at 783.

<sup>274</sup> OAGOOGL0004950038-63 at 39.

<sup>275</sup> OAGOOGL0004950038-63 at 54.

<sup>276</sup> OAGOOGL0005117411-419 at 412.

<sup>277</sup> OAGOOGL0005117411-419 at 413.

<sup>278</sup> OAGOOGL0004936380-436 at 401.

<sup>279</sup> OAGOOGL0005117411-419 at 419.

<sup>280</sup> OAGOOGL0004936380-436 at 410.

<sup>281</sup> OAGOOGL0004950038-63 at 41.



213. As discussed in my Initial Report, Sun was planning to address the migration of market share from feature phones to smartphones with Project Acadia.<sup>282</sup> Sun was preparing to transition into the smartphone market given its understanding that “the industry is currently in a period of transition, it is critical that we step in and begin grabbing market share as quickly as possible before the industry and/or the market settles on a specific solution or set of solutions.”<sup>283</sup> To that point, Google also understood the value Java provided with respect to the transition from feature phones to smartphones, as evidenced by an August 2007 internal Google email which states: “I can tell you there are tens of thousands of Java developers who just can’t wait to write mobile applications.”<sup>284</sup>
214. A March 2008 “Acadia Strategy” presentation identifies the “Short window to enter as a relevant contender – “Microsoft & Nokia becoming more serious (organically & inorganically).”<sup>285</sup> As such, Sun was aware it needed to capitalize on the “short market window” given its recognition that “[u]naligned OEMS [were] getting more serious about selecting ‘advanced phone’ platform” and “[a]dvanced phones [were] becoming mainstream, need replacement for in-house RTOS stacks.”<sup>286</sup>
215. Sun also recognized that: “Nokia, Microsoft, & Qualcomm are racing to drive smartphone capabilities to feature phone volume & price point: Operators & content ISVs are driving for non-proprietary alternatives; Java/Linux is well positioned to take significant market share”<sup>287</sup>

## 5.8 Nokia’s Role in Sun’s Expansion Into the Smartphone Market

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216. Sun’s opportunity to obtain significant smartphone market share was in part due to its relationships in the industry. I understand that Nokia had 48 percent of the mobile device market share in 2006.<sup>288</sup> According to the Bloomberg Research “2006 was the year of the converged device with 80 million smart phones shipped worldwide, according to analysts – and Nokia remains the unequivocal leader selling almost one in two smart mobiles.”<sup>289</sup> RIM was Nokia’s nearest competitor, with six million phones and 7.5 percent of the market.<sup>290</sup> Given Java was enabled on

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<sup>282</sup> OAGOOGL0001872552 –555 at 552.

<sup>283</sup> OAGOOGL0019801560-587 at 565-566.

<sup>284</sup> GOOGLE-01-00029331-332 at 331; Trial Exhibit 387.

<sup>285</sup> OAGOOGL0002778854-882 at 869.

<sup>286</sup> OAGOOGL0002778854-882 at 882. RTOS refers to run-time OS which was commonly used in feature phones and tended to be proprietary; see for example, <http://www.visionmobile.com/blog/2009/07/feature-phones-and-the-rtos-the-ignored-85-of-the-market/>.

<sup>287</sup> OAGOOGL0005039944 –962 at 947.

<sup>288</sup> <http://www.bloomberg.com/bw/stories/2007-02-27/nokia-tops-in-2006-smartphone-salesbusinessweek-business-news-stock-market-and-financial-advice>.

<sup>289</sup> <http://www.bloomberg.com/bw/stories/2007-02-27/nokia-tops-in-2006-smartphone-salesbusinessweek-business-news-stock-market-and-financial-advice>.

<sup>290</sup> <http://www.bloomberg.com/bw/stories/2007-02-27/nokia-tops-in-2006-smartphone-salesbusinessweek-business-news-stock-market-and-financial-advice>.



the majority of these phones and Sun had relationships with both Nokia and RIM, it was well positioned to capitalize on the transition from feature phones to smartphones.

217. Throughout the unique window of opportunity, Sun and Nokia continued to address a changing market. Nokia recognized this opportunity as early as 2005, noting: “Mobile communications is converging in some areas with computing, digital imaging, and the internet, making it possible for consumers to use handheld devices for filming video, listening to music, playing games, surfing the web, and more. Nokia is shaping this converging industry, pushing it forward with cutting-edge products and the development of open standards.”<sup>291</sup> Nokia’s position to capitalize on the transitioning market, in partnership with Sun, would have been expected at the time because Nokia was identified as the “only traditional handset manufacturer that has been able to put forth a quality software platform for advanced devices.”<sup>292</sup>
218. Expectations for Nokia and Sun did not change until after Google shopped Android around privately to OEMs and carriers before publicly releasing Android in 2008, as reflected by the fact that, as late as 2007, “Nokia continue[d] to target an increase in its market share in mobile devices”<sup>293</sup> Also, around that time, Nokia specifically identified competition and unlawful use of its intellectual property as a risk factors for its mobile device market share:

*Competition in the industry is intense. Our failure to maintain or improve our market position and respond successfully to changes in the competitive landscape may have a material adverse impact on our business and results of operations.*<sup>294</sup>

...

*Our products and solutions include numerous new Nokia patented, standardized, or proprietary technologies on which we depend. Third parties may use without a license or unlawfully infringe our intellectual property or commence actions seeking to establish the invalidity of the intellectual property rights of these technologies. This may have a material adverse effect on our results of operations.*<sup>295</sup>

219. Nokia was the largest mobile device provider in 2006 and Java was used in all of its devices.<sup>296</sup> At that time, Sun had an ongoing dialogue with Nokia regarding a strategy to produce a more consistent industry implementation of Java ME.<sup>297</sup> The parties ultimately reached an agreement whereby Sun would align its Java ME with Nokia’s implementation to improve consistency across

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<sup>291</sup> Nokia 2005 Corporate Responsibility Report, p. 25

(<http://company.nokia.com/sites/default/files/download/nokia-cr-report-2005-pdf.pdf>).

<sup>292</sup> OAGOOGL0019801560-19801587 at 1565.

<sup>293</sup> Nokia 2006 Annual Report, p. 6 ([https://bib.kuleuven.be/files/ebib/jaarverslagen/NOKIA\\_2006.pdf](https://bib.kuleuven.be/files/ebib/jaarverslagen/NOKIA_2006.pdf)).

<sup>294</sup> Nokia 2006 Annual Report, p. 6 ([https://bib.kuleuven.be/files/ebib/jaarverslagen/NOKIA\\_2006.pdf](https://bib.kuleuven.be/files/ebib/jaarverslagen/NOKIA_2006.pdf)).

<sup>295</sup> Nokia 2006 Annual Report, p. 6 ([https://bib.kuleuven.be/files/ebib/jaarverslagen/NOKIA\\_2006.pdf](https://bib.kuleuven.be/files/ebib/jaarverslagen/NOKIA_2006.pdf)).

<sup>296</sup> Deposition of Alan Brenner, December 15, 2015, p. 151.

<sup>297</sup> Deposition of Alan Brenner, December 15, 2015, pp. 227-234.



products.<sup>298</sup> Since Nokia and Sun represented the majority of the mobile device market, their partnership was expected to force the industry to align with their emerging implementation standards.<sup>299</sup> For example, many licensees such as Samsung relied on Sun source code for internal implementation. Therefore, just by receiving Sun's updates they would become aligned.<sup>300</sup>

220. On June 28, 2006, Sun and Nokia entered into a Technology License and Distribution Agreement ("Nokia TLDA").<sup>301</sup> Under the agreement, Sun granted Nokia, subject to compatibility requirements and other limitations, a license to certain Java ME, Java SE, and Java EE specifications and implementations. The field of use for the licensed technology was limited to Mobile Devices.<sup>302</sup> I also understand Sun entered into its agreement with Nokia to protect the future of its platform as the market transitioned to smarter mobile devices.<sup>303</sup> However, despite the intentions of Sun and Nokia, a November 2009 Sun Java ME projection considered a reduction of \$7 million for Nokia due to a shift in "emphasis to Android."<sup>304</sup>
221. Finally, although Sun realized it did not have a "meaningful" consumer brand to capitalize on the unique market opportunity, it actively looked to partnerships with companies such as Nokia.<sup>305</sup> Around the time of Google's first infringement, Nokia was a leading brand in the mobile phone market, as evidenced by a 2005 Interbrand survey which identified Nokia as the world's sixth most valued brand.<sup>306</sup> Also in 2005, a Top 100 Brands list included Nokia at number 6 and Google at 38.<sup>307</sup> However, today Google has surpassed Nokia in terms of brand value, no doubt due (at least in part) to Android.

## 5.9 Sun/Oracle Investment in Java ME

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222. Dr. Leonard has also opined that a lack of investment in Java ME was a cause of its revenue decline.<sup>308</sup> However, Dr. Leonard's analyses and related opinions inappropriately rely on sources of information dated long after Android was first introduced in 2009.<sup>309</sup>
223. As support for his opinion that a lack of investment caused the decline in Java ME revenue, Dr. Leonard references deposition testimony that, in 2013 Oracle decided "not to focus on making a

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<sup>298</sup> Deposition of Alan Brenner, December 15, 2015, pp. 230-231.

<sup>299</sup> Deposition of Alan Brenner, December 15, 2015, pp. 230-231.

<sup>300</sup> Deposition of Alan Brenner, December 15, 2015, pp. 233-236.

<sup>301</sup> OAGOOGL2000181111-146 at 128

<sup>302</sup> OAGOOGL2000181111-146 at 136

<sup>303</sup> Deposition of Vineet Gupta, July 26, 2011, pp. 280-282.

<sup>304</sup> OAGOOGL0000457797-801 at 797.

<sup>305</sup> OAGOOGL0002778854- 2778882 at 869.

<sup>306</sup> "Nokia 2005 Corporate Responsibility Report," <http://company.nokia.com/sites/default/files/download/nokia-cr-report-2005-pdf.pdf>, p. 24.

<sup>307</sup> [http://www.businessweek.com/pdfs/2005/0531\\_globalbrand.pdf](http://www.businessweek.com/pdfs/2005/0531_globalbrand.pdf)

<sup>308</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 116.

<sup>309</sup> Expert Report of Dr. Leonard, February 8, 2016, pp. 116-119.



new major version of Java ME update, targeting the phone business, because we didn't believe that we would get a net option for it, basically."<sup>310</sup> Similarly, Dr. Leonard relies on deposition testimony that around April 2012, Java ME was an "old technology stack" and "if you wanted to continue to use and license Java ME and, in particular, to be able to compete with something like Android, you would have to make significant investments in it."<sup>311</sup> Not only do these decisions made by Oracle more than five years after Google began using the Infringed Java Copyrights not support Dr. Leonard's opinions, they are consistent with (and provide support for) my opinion that Oracle was forced to alter expectations and plans for Java ME following Google's infringement.

224. That said, I note that Sun continued to invest in Java ME prior to and overlapping with the early stages of Android. According to a March 2009 Sun presentation, Sun estimated it would invest 49 percent of its anticipated Java wireless revenue on Research & Development (R&D).<sup>312</sup> In this same presentation, Sun compared its Java related Research & Development investment to its "peers" that only invested 14 to 21 percent of total revenue.<sup>313</sup> This illustrates that Sun continued to make relatively significant R&D investments in Java throughout at least 2009.<sup>314</sup>

## 6. RESPONSE TO DR. LEONARD'S TECHNICAL OPINIONS

### 6.1 Dr. Leonard Improperly Offers Many Technical Opinions

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225. Dr. Leonard has independently offered many technical opinions for which he cites to no supporting technical evidence and/or opinions. Listed below are several examples of such opinions from Dr. Leonard:

- Google's contribution to the Android platform including the Linux kernel, Hardware Abstraction Layer, native libraries, core libraries, the Android framework, Android Run Time and Applications Layer;<sup>315</sup>
- The potential effects of 'familiarity' with the 37 Java APIs were small at best;<sup>316</sup>
- Even if the 37 Java APIs were 'stable' in and of themselves, their use would in no sense guarantee stability of Android as a whole;<sup>317</sup>
- Any 'stability' that Java might have is not unique to Java;<sup>318</sup>

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<sup>310</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 117.

<sup>311</sup> Expert Report of Dr. Leonard, February 8, 2016, pp. 117-118.

<sup>312</sup> Trial Exhibit 560, OAGOOGL0003388109-138 at 115.

<sup>313</sup> Trial Exhibit 560, OAGOOGL0003388109-138 at 115.

<sup>314</sup> Trial Exhibit 560, OAGOOGL0003388109-138 at 115.

<sup>315</sup> Expert Report of Dr. Leonard, February 8, 2016, pp 35-39.

<sup>316</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 46.

<sup>317</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 47.

<sup>318</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 47.



- Any advantage Java offered over these other languages was small and also accompanied by disadvantages.<sup>319</sup>

226. Dr. Leonard draws inappropriate and unqualified opinions about these (and other) technical topics as they relate to damages. In connection with offering these opinions, Dr. Leonard does not cite to any qualified technical opinion from a Google technical expert (or any other reliable source), and thus the conclusions he draws from such technical opinions are unsupported and unreliable.

## **6.2 Dr. Leonard's Technical Opinions Are Unreliable**

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227. Based on my discussions with Oracle's technical experts and my review of their expert reports, I understand each of the following technical opinions put forth by Dr. Leonard is unreliable.

### **6.2.1 Dr. Leonard's View Regarding Reasons for the Success of Android – Other Than the Alleged Infringement**

228. Dr. Leonard cites reasons for the success of Android other than the infringement of the 37 Java APIs including Google's efforts, Google's decisions to make Android free and open source, and the efforts of OEMs.<sup>320</sup>
229. I understand that Dr. Schmidt has addressed this issue by investigating and determining that "Android is not usable on a computing device, such as a phone or tablet, without each of the Java API packages at issue or the copied declaring code in them."<sup>321</sup> Therefore, without use of the Infringed Java Copyrights, the additional efforts of Google, and the efforts of the OEMs would be moot since Android would not be functional without them.
230. Dr. Leonard states that "Google has provided ways for developers to write applications in programming languages other than Java... the Native Development Kit (NDK) allows a developer to write an Android application in C or C++"<sup>322</sup>
231. I understand that contrary to Dr. Leonard's opinion, Google has acknowledged that generally there is no performance increase in using the NDK and advises that "[b]efore downloading the NDK, you should understand that the NDK will not benefit most apps...Notably, using native code on Android generally does not result in a noticeable performance improvement, but it always increases your app complexity. In general, you should only use the NDK if it is essential to your app – never because you simply prefer to program in C/C++."<sup>323</sup>

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<sup>319</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 48.

<sup>320</sup> Expert Report of Dr. Leonard, February 8, 2016, pp. 34-46.

<sup>321</sup> Expert Report of Dr. Schmidt, Jan 8, 2016, ¶ 78.

<sup>322</sup> Expert Report of Dr. Leonard, February 8, 2016, ¶ 76.

<sup>323</sup> <http://developer.android.com/tools/sdk/ndk/index.html>.



232. Due to the fact that the initial NDK was available in 2009<sup>324</sup>, the NDK would not have been available to developers from 2008 to 2009. Thus, despite Dr. Leonard's assertions that alternatives to Java existed and developers had the option of choosing multiple programming languages, this was simply not the case - as support for other programming languages did not initially exist. Later, while the use of Java was encouraged, C++ became supported, but its use was discouraged by Google.<sup>325</sup>
233. Dr. Leonard states that, "Google contributed many popular Android applications that were important for getting the Android ecosystem off the ground... pre-loaded on many Android devices, including Google Maps, Gmail, YouTube and Google Play."<sup>326</sup> I understand from Dr. Kemerer's analysis, "Android and its 'top apps' have a high dependency on the 37 Java APIs."<sup>327</sup> Thus, Dr. Leonard's statements regarding Google's contribution could not have occurred without the Infringed Java Copyrights, which were an integral piece of the Google Mobile Services applications that Dr. Leonard refers to.<sup>328</sup>
234. I understand that Dr. Kemerer refers to centrality as "a metric that is used to describe the relative importance of a particular entity, or node, within a network of interconnected entities"<sup>329</sup> and that Dr. Kemerer has found that the centrality of the copied code is 9.06 times greater than non-copied code. I understand that this analysis indicates "the classes Google copied are of consistently high centrality to the Java SE platform."<sup>330</sup>
235. Dr. Leonard does not appear to rely on any empirical evidence that the Linux Kernel, Android Runtime, Hardware abstraction layer and other components of the Android platform contribute to Android's success. I understand the only empirical evidence in the case is from Dr. Kemerer and Dr. Schmidt and they have demonstrated that the 37 APIs are central to the success of the platform. The relative contribution of the other components cited by Dr. Leonard have not been attributed to any technical analysis for support.

## 6.2.2 Dr. Leonard's View Regarding 37 APIs Valued Equally to Other Android APIs

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<sup>324</sup> <http://android-developers.blogspot.com/2009/06/introducing-android-15-ndk-release-1.html>; [http://developer.android.com/ndk/downloads/revision\\_history.html](http://developer.android.com/ndk/downloads/revision_history.html); <http://android-developers.blogspot.com/2009/06/introducing-android-15-ndk-release-1.html>

<sup>325</sup> <http://developer.android.com/tools/sdk/ndk/index.html>

<sup>326</sup> Expert Report of Dr. Leonard, February 8, 2016, ¶ 79.

<sup>327</sup> Expert Report of Dr. Kemerer, January 8, 2016, ¶ 160.

<sup>328</sup> Expert Report of Dr. Leonard, February 8, 2016, ¶ 79.

<sup>329</sup> Expert Report of Dr. Kemerer, February 8, 2016, ¶ 28.

<sup>330</sup> Expert Report of Dr. Kemerer, February 8, 2016, ¶ 41.



236. Dr. Leonard claims “the 37 Java APIs at issue constitute only a small portion of the overall Android code base,”<sup>331</sup> and his “top-down” apportionment analysis implicitly assumes equal weighting of the Infringed Java Copyrights relative to other aspects of the Android platform.
237. I understand Dr. Kemerer has performed stability and centrality analyses to determine the relative importance of the 37 Java API packages to the Android platform. I also understand he has found that “the 37 Java APIs are highly central within the Android platform compared to the non-copied APIs and, thus, Google copied a substantial portion of the Java SE platform.”<sup>332</sup> I also understand that Dr. Kemerer found that the 37 Java APIs contributed to stability of the Android platform and the 37 Java APIs are also important to many popular apps.<sup>333</sup>
238. Also, as discussed previously in Section 6, I also understand that the 37 Java APIs contribute greater value to Android than other aspects of the Android platform.

### **6.2.3 Dr. Leonard’s View Regarding Minimal Advantages of Java – Other Programming Languages Were Considered**

239. Dr. Leonard has asserted that Google could have chosen to use one of many other existing applications programming languages and “[a]ny advantage Java offered over these other languages was small and also accompanied by disadvantages.”<sup>334</sup>
240. I understand that Google chose to base the Android platform on the 37 Java APIs because of the Java platform’s key attributes, as explained by Dr. Schmidt.<sup>335</sup> Some of these attributes include the popularity of the Java platform, as well as the many tools “available for writing, refactoring, debugging, optimizing, and deploying Java applications.”<sup>336</sup> I also understand that other existing applications programming languages did not offer these key attributes, and thus Dr. Leonard’s statement that “Google could have chosen to use one of many other existing applications programming languages”<sup>337</sup> is without basis and empirical support.
241. I also note the previously discussed Court order confirming that consideration of non-infringing alternatives for the purpose of evaluating wrongful profit is improper. As Dr. Leonard is now taking a similar position regarding non-infringing alternatives, it is equally irrelevant. That being said, I understand there were other options that had the key benefits of the Java platform available to Google for the reasons discussed in Dr. Schmidt’s expert report. Dr. Schmidt explains that

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<sup>331</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 47.

<sup>332</sup> Expert Report of Dr. Kemerer, January 8, 2016, section VI(c); February 8, 2016 report, section VI(B).

<sup>333</sup> Expert Report of Dr. Kemerer, January 8, 2016, section VI(b) and p.39-41; February 29, 2016 report, sections IV, V.

<sup>334</sup> Expert Report of Dr. Leonard, February 8, 2016, ¶ 100.

<sup>335</sup> Expert Report of Dr. Schmidt, January 8, 2016, p. 31.

<sup>336</sup> Expert Report of Dr. Schmidt, January 8, 2016, p. 31.

<sup>337</sup> Expert Report of Dr. Leonard, ¶ 100.



“while a number of different language platforms offered useful features in the mid-2000s, none combined the value of an app developer friendly platform with published specifications intended to ensure compatibility that was widely adopted by a large number of app developers.”<sup>338</sup> Dr. Schmidt further explains the drawbacks and deficiencies of numerous platforms that Google considered and declined to implement in favor of the Java platform.<sup>339</sup> Thus, the Java platform including the 37 Java APIs was the best option available to Google and all of Dr. Leonard’s unsupported statements directed to the minimal advantages associated with the Java platform are incorrect and unreliable.<sup>340</sup>

#### **6.2.4 Dr. Leonard’s View Regarding Lack of Importance of Java Developers Familiarity with Android**

242. Dr. Leonard states that “economic evidence demonstrates that these potential effects of “familiarity” with the 37 Java API packages were small at best, which would mean that the contribution of the alleged infringement to Android-related profits was small as well.”<sup>341</sup>
243. I understand that Dr. Schmidt explained that, for developers, “writing code in general, and reusable APIs in particular, is a time consuming and highly creative effort that requires considerable resources and creative effort.”<sup>342</sup> I also understand from Dr. Kemerer that “Google benefited from using the copied code and the structure, sequence and organization of the 37 Java API packages to leverage their popularity and familiarity among developers in order to quickly attract developers to the Android platform when it was first created.”<sup>343</sup>
244. I also understand that Daniel Bornstein, the key architect of the Dalvik virtual machine was asked “[w]hy did the Android team select Java to be the main language for Android” and he explained that “there was a good open source community around developers that use the Java programming language. There were good tools, such as Eclipse, that were other open source tools that worked with that programming language. There were already a number of good open source libraries written in the programming language. I think all of these things were – I guess I would consider all of those things to be sort of, so to speak, in favor.”<sup>344</sup>
245. I understand that Dr. Schmidt described many of the key attributes of the Java platform including enhanced programmer productivity, increased app security, and efficient garbage collection for memory management in order to build more efficient applications.<sup>345</sup> Since none of the other

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<sup>338</sup> Expert Report of Dr. Schmidt, February 29, 2016, ¶ 43.

<sup>339</sup> Expert Report of Dr. Schmidt, February 29, 2016, pp 19-21.

<sup>340</sup> Expert Report of Dr. Schmidt, February 29, 2016, Sections VI(B) and (C).

<sup>341</sup> Expert Report of Dr. Leonard, ¶ 97.

<sup>342</sup> Expert Report of Dr. Schmidt, February 8, 2016, ¶ 194.

<sup>343</sup> Expert Report of Dr. Kemerer, February 8, 2016, ¶ 108.

<sup>344</sup> Deposition of Daniel Bornstein, May 16, 2011, pp 48-49.

<sup>345</sup> Expert Report of Dr. Schmidt, February 29, 2016, ¶ 33.



platforms available to Google at the time had these advantages, the importance of attracting Java developers to the Android platform was a significant motivating factor for Google to adopt Java and it was necessary for Google to copy the 37 Java APIs in order to so.

246. Google was faced with the option of adopting a different platform, which it was not able to for the reasons explained above, or creating its own set of APIs to function in the same way as the 37 Java APIs. As Dr. Schmidt indicated, developing an independent platform would have involved “time, effort and technical risk”<sup>346</sup> and due to Google’s time pressures it was not in a position to develop anything similar internally in the time window that it faced. Thus, it is clear that Java was the only option that Google had in order to attract developers to the Android platform.

### **6.2.5 Dr. Leonard’s View Regarding the Ease with Which Programmers Move from one Language to the Next**

247. Dr. Leonard states that “it would have been as easy for an applications developer who had written an iPhone application in Objective C to port that application to C/C++ for use in Android as it was to port it to or write it from scratch in the Java programming language.”<sup>347</sup> He also opines that “[p]rogrammers familiar with one language typically find it relatively easy to pick up other languages.”<sup>348</sup>
248. As discussed previously, although a skilled programmer is likely familiar with multiple programming languages, in order to build a robust mobile application in multiple programming environments that will remain stable for increasing number of users, such as the Facebook or Yelp applications, it would require significant additional time and effort. Although programmers may be trained in multiple languages, Dr. Leonard conflates the ability of a programmer to code in multiple languages with a programmer’s ease of accurately and effectively developing robust commercial applications in multiple programming languages.
249. At Google I/O in May 2011, Google announced that there were 450,000 Android developers around the world.<sup>349</sup> It is unlikely that the number of Android developers would have been significant if a new programming language was required to learn in order to develop for the new platform. In February 2015, Intel mentioned “millions of Android developers are dedicated to building stable and scalable applications.”<sup>350</sup> As of 2014, Android was catching up to iOS in terms of developer preference and there is considerable overlap in terms of how developers classified their primary and secondary platform preferences.<sup>351,352</sup> Therefore, I understand that programming

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<sup>346</sup> Expert Report of Dr. Schmidt, February 29, 2016, ¶ 36.

<sup>347</sup> Expert Report of Dr. Leonard, February 8, 2016 ¶ 106.

<sup>348</sup> Expert Report of Dr. Leonard, February 8, 2016 ¶ 107.

<sup>349</sup> <http://www.cnet.com/news/google-amps-up-the-media-experience-live-blog/>.

<sup>350</sup> <https://software.intel.com/en-us/android/articles/tips-for-optimizing-android-application-memory-usage>.

<sup>351</sup> <http://readwrite.com/2014/01/14/tablet-developers-now-target-android-but-wheres-the-money>.

<sup>352</sup> <http://www.developereconomics.com/report/q3-2013-the-multi-platform-developer/>.



languages are not interchangeable and it is a non-trivial task to learn a new language and program proficiently in it, otherwise there would not be a distinction between preferences for platform languages.

### 6.2.6 Dr. Leonard's View Regarding Stability of Java v. Stagnation

250. Dr. Leonard states that "Sun's Java platform (and its APIs) did not change not because of "stability", but because Sun stopped innovating. Stagnation (lack of innovation) is not a positive and, in fact, this stagnation explains why Java's popularity was declining prior to the introduction of Android."<sup>353</sup>
251. I understand that Dr. Leonard's view regarding the stagnation of Java is factually incorrect. All of the 37 Java APIs at issue have been a core part of the Java platform since at least September 2004, and I understand that some portion of the 37 Java APIs have been a core part of the Java platform since its earliest releases.<sup>354</sup> I understand that the 37 Java APIs have enabled additional functionality to be built on top of them and that the 37 Java APIs are routinely called by other APIs within the platform.<sup>355</sup> Java had an established ecosystem which included the following attributes enumerated by Dr. Jaffe: widespread acceptance among vital platform partners like OEMs and wireless carriers; a familiar, well-tested applications platform that ran predictably, a stable, educated deep-rooted developer community; and the ability to reach the market faster with a technically stable, lower-risk commercially successful product.<sup>356</sup>
252. I understand that Dr. Kemerer conducted "an analysis of the importance of the 37 Java APIs to the Android platform by assessing the degree to which they contributed to the stability of the Android platform." In connection with preparing that analysis, I understand he considered "the relative changes in the method declarations of the 37 Java APIs copied in Android, as compared to other APIs in the Android core libraries and frameworks" and found "[T]here is much less change and thus much greater stability of the 37 Java APIs, compared to other APIs in Android."<sup>357</sup> I understand that since the 37 Java APIs were more stable than the rest of the APIs in Android, the stability of the 37 Java APIs would necessarily provide more stability to the Android platform, contrary to what Dr. Leonard states. These 37 Java APIs did not change, not because of stagnation, but because they were optimized for efficiency and did not require further changes.
253. Therefore, I understand that the Java platform was not stagnant in any sense, but provided a stable platform that served as the basis on which Google, BlackBerry, Amazon and other companies built

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<sup>353</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 47.

<sup>354</sup> Expert Report of Dr. Kemerer, January 8, 2016, p. 3

<sup>355</sup> Expert Report of Dr. Kemerer, January 8, 2016, ¶ 51; Expert Report of Dr. Schmidt, February 8, 2016, ¶¶ 233 and 237.

<sup>356</sup> Expert Report of Dr. Jaffe, February 8, 2016, ¶ 161; Expert Report of Dr. Kemerer, February 8, 2016, ¶ 103.

<sup>357</sup> Expert Report of Dr. Kemerer, February 8, 2016, ¶ 55.



reliable large-scale commercial products. I note that this issue is also addressed in my response to Dr. Leonard's lost profit opinions.

#### **6.2.7 Dr. Leonard's View that iPhone Success Shows Familiarity of Platform not Indicator of Success**

254. Dr. Leonard claims that "despite the lower levels of familiarity with Objective C, there has been an explosion in applications developed for the iPhone. This shows that developers are willing and able to respond to market opportunities by adapting and learning to program in previously unfamiliar languages."<sup>358</sup>
255. As I discussed previously, I understand developer interest and acceptance in programming in Objective C is incentivized largely by the attractive developer revenue-sharing model that Apple provides for its developers, and not because developers prefer a lesser known language like Objective C over a widely known language like Java. I also understand this is not an indication that programmers are less inclined to using a familiar language, rather this is an indication that the financial incentives for developers to recoup their costs by developing on the iOS platform are higher. Dr. Leonard appears to reach an incorrect conclusion on the success of a smartphone platform by basing it solely on the developer revenue sharing model of a digital distribution platform.
256. Dr. Leonard uses reductive logic to minimize the importance of the Java platform, but he fails to address the fact that, if Android had not chosen the Java platform for use in Android, there would not have been an ecosystem of OEMs, carriers, and developers for Google to monetize. The Java ecosystem of OEMs, carriers, and developers was already in place and by using the Java platform for the Android platform, Google could readily go to market and not be far behind Apple. Simply implementing a different programming language overlooks all of the related features of a platforms' success.
257. Moreover, Dr. Leonard fails to consider other aspects of these mobile platforms that would factor into developer choice. For example, some developers prefer to develop first for iOS because there is no fragmentation and there is consistency in hardware. iOS developers do not need to account for many different physical specifications across the same class of device, unlike Android developers. Additionally, in a tightly-controlled environment like iOS, developers can "get the details right" first and then port their apps over to Android.<sup>359</sup>
258. Lastly, as seen below, some developers choose to develop for whatever platform is in a language that they are familiar with already.

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<sup>358</sup> Expert Report of Dr. Leonard, February 8, 2016 ¶ 117.

<sup>359</sup> <http://tech.co/android-ios-development-2015-04>.



*When Apple released the iPhone SDK in 2008, I had already been working with the Objective-C programming language for several years. Developing for iOS was very easy to explore. I bought some iOS programming books, but I already had enough knowledge to get started. Nowadays, I only need to consult API documentation. If I had found significant stumbling blocks with iOS, I could've made the decision to switch to another platform such as Android.*<sup>360</sup>

#### **6.2.8 Dr. Leonard's View that Blackberry's Lack of Success Shows that Java Platform is Not an Indicator of Success**

259. Dr. Leonard states that, “despite having Java as an applications programming language and despite offering users many of the same most popular apps as Android, BlackBerry quickly lost out to the iPhone and Android handsets. This demonstrates the minor role that the particular choice of applications programming language plays in the success of a platform as compared to the features of the hardware, features of the operating system itself, and strategic choices of the vendor.”<sup>361</sup> I find his analysis flawed for several reasons.
260. First, I understand that Dr. Kemerer found that “[o]ne of the contributing factors to this decline [of BlackBerry market share] was the relative dearth of BlackBerry apps measured against their competitors” and such industry examples “stress the important role of the app developer community in bolstering the health a mobile platform.”<sup>362</sup> Thus, the selection of the Java platform for use in BlackBerry was actually not the reason for BlackBerry’s competitive struggles; instead, it was the lack of available applications, among other market constraints. In addition, BlackBerry had been a successful Java-based platform in the late 1990s to mid-2000s and as of September 2008, BlackBerry had 50% of the smartphone market in the US.<sup>363</sup> Therefore, Dr. Leonard has failed to understand and accurately apply the issues that caused BlackBerry’s recent lack of success, and incorrectly attributes BlackBerry’s decline to Java, which is clearly not based on historical facts.
261. I understand the very choice to use the Java platform for Android is what allowed Android to achieve platform success in a short timeframe because, by doing so, Android was able to leverage the already existing ecosystem of OEMs, carriers, and developers that Sun had spent years cultivating around the Java platform.
262. Android emerged in 2008, when smartphone demand was beginning to come from consumers rather than enterprise customers. Consumers wanted phones that could do more than just communicate and enable productivity – they wanted phones that could entertain them.<sup>364</sup> Around the same time, the financial crisis decimated enterprise demand for high-end handsets. Macquarie Capital wrote in a 2009 equity research report: “we believe that the increasing willingness of

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<sup>360</sup> <http://tech.co/android-ios-development-2015-04>.

<sup>361</sup> Expert Report of Dr. Leonard, February 8, 2016 ¶ 121.

<sup>362</sup> Expert Report of Dr. Kemerer, February 9, 2016, ¶ 112.

<sup>363</sup> <http://www.foxnews.com/story/2008/09/09/blackberry-maker-snags-half-us-smartphone-market.html>.

<sup>364</sup> <http://www.informationweek.com/smartphone-consumer-demand-growing/d/d-id/1090441>.



enterprises to provide mobile email to employees will slow in the global recession. This will especially be the case in North America and the credit crisis has decimated traditional RIM customers such as banks and law firms.”<sup>365</sup> Analysts also expected “RIM to face increasing competition as it struggles in an increasingly competitive [enterprise] sector. As a result of Apple and Android device popularity, we anticipate reduced demand from RIM’s traditional stronghold, enterprise users.”<sup>366</sup>

263. BlackBerry launched its app store, BlackBerry App World in 2009, almost a full year after Google and Apple had launched their respective app stores. Moreover, their traditional user base of “large corporate customers didn’t want personal applications on corporate phones,” which would have depressed demand for apps on the BlackBerry platform rather than any shortcoming of Java.<sup>367</sup>
264. Therefore, Dr. Leonard’s analysis of the “BlackBerry experience” is flawed because it fails to consider the contextual factors that contributed to BlackBerry becoming sidelined as a platform. Dr. Leonard’s analysis is further flawed because he fails to consider that BlackBerry actually had been a successful Java-based platform in the late 1990s to mid-2000s, before Android entered the market. In September 2008, BlackBerry had 50% of the smartphone market in the US and at its peak during the 2007-2015 time period, it had about 12% of the overall mobile phone market in the US.<sup>368</sup> All BlackBerry phones from BlackBerry OS 7 and earlier were Java-based.<sup>369</sup> Finally, although the BlackBerry OS was Java-based and proprietary, developers did not seem to find Java or the closed nature of the platform a deterrent: “The BlackBerry OS platform was limited to Java and HTML5. While not actually more difficult to develop for, creating a genuinely good app experience on a BlackBerry OS app was much harder.”<sup>370</sup> In actuality, other features of the BlackBerry OS platform, such as cumbersome development tools and an unestablished app store, deterred developers from building for the platform.<sup>371</sup>
265. For all of the reasons above, it is improper for Dr. Leonard to conclude that Java as a platform choice played a role in BlackBerry’s lack of success.

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<sup>365</sup> February 2009 Macquarie Capital Equity Research Report.

<sup>366</sup> June 20, 2011 Equity Research Report on RIM, Macquarie.

<sup>367</sup> <http://www.theglobeandmail.com/report-on-business/the-inside-story-of-why-blackberry-is-failing/article14563602/?page=all>.

<sup>368</sup> <http://www.foxnews.com/story/2008/09/09/blackberry-maker-snags-half-us-smartphone-market.html>; Expert Report of Dr. Leonard, February 8 2011, Exhibit 5a.

<sup>369</sup> <http://www.zdnet.com/pictures/a-history-of-blackberry-in-nine-iconic-handsets-and-one-meh-tablet-photos/2/>; <http://www.blackberry.com/news/connection/200201.shtml>; <http://www.javaworld.com/article/2073501/blackberry-going-with-qnx--java-me-to-lose-its-highest-profile-os.html>

<sup>370</sup> <http://n4bb.com/memory-leaks-dark-blackberry-7/>; <https://www.quora.com/Is-developing-apps-for-BlackBerry-OS-more-challenging-than-developing-apps-for-iOS-and-Android#>.

<sup>371</sup> <https://spin.atomicobject.com/2010/11/22/the-cost-of-building-blackberry-apps/>; <http://www.digitaltrends.com/mobile/blackberrys-app-world-can-it-ever-catch-up-to-apple-android/>.



### 6.2.9 Dr. Leonard's View Regarding the OpenJDK

266. Dr. Leonard states that “[t]he fact Sun chose to open-source its Java SE reference implementation including the allegedly copyrighted material, demonstrates that the contribution of the allegedly infringing material to the value (profit) of a platform like Android was not particularly large.”<sup>372</sup>
267. I understand that Gwyn Murray has concluded that “Google’s incorporation of OpenJDK-based code in the master branch of Android poses a significant risk that additional elements of the Android stack (including modifications made by OEMs) would be subject to the requirements of GPLv2CE.”<sup>373</sup> I also understand that Dr. Kemerer found that “OpenJDK is not pertinent to the impact of Google’s use on the market for Java, because Google would never have accepted the license for OpenJDK” and because OEM’s would not have accepted GPLv2CE either.<sup>374</sup> Finally, I note the record evidence shows that Google did not in fact accept the license for OpenJDK.<sup>375</sup>
268. Dr. Leonard appears to incorrectly assume that the 37 Java APIs in OpenJDK would function in Android in the same way as the 37 Java APIs from Java SE. However, I understand that, had Google opted to use OpenJDK at the time Android was first announced, it would have been a high business risk for Google that OEMs would have rejected Android and not a risk they were willing to take. Indeed, Google intentionally did not opt for OpenJDK before releasing Android.<sup>376</sup>

## 7. RESPONSIVE OPINIONS REGARDING APPORTIONMENT

### 7.1 Apportionment Framework for Infringer’s Profits

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269. I understand that, when apportioning profits, an expert should not consider the infringing work’s quantitative share of the total, but rather its relative value to the overall work.<sup>377</sup> I also understand an expert should consider the relative quality of the various components of an overall work, and where the infringing portion gives the infringing firm a unique claim or the ability to market something it otherwise couldn’t, the qualitative contribution of the infringed work – and not merely its simple pro rata share of the total work – should guide the apportionment analysis.<sup>378</sup>

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<sup>372</sup> Expert Report of Dr. Leonard, February 8, 2016, p. 72.

<sup>373</sup> Murray report, ¶ 164.

<sup>374</sup> Expert Report of Dr. Kemerer, February 8, 2016, ¶¶ 25 and 258.

<sup>375</sup> Trial Exhibit 154; Trial Exhibit 230.

<sup>376</sup> Trial Exhibit 154; Trial Exhibit 230.

<sup>377</sup> Litigation Services Handbook, The Role of the Financial Expert (Third Edition), Roman L. Weil, Michael J Wagner, Peter B. Frank (2001) Chapter 22. p. 7.

<sup>378</sup> Litigation Services Handbook, The Role of the Financial Expert (Third Edition), Roman L. Weil, Michael J Wagner, Peter B. Frank (2001) Chapter 22. p. 7.



270. As such, an apportionment based on the pro-rata share a copyright holds of an overall work (e.g. lines of code as a percentage of total lines of code) ignores the relative value of the copyright. In this current matter, although the Infringed Java Copyrights may represent a small portion of the entire Android source code, as discussed previously in this report and throughout my Initial Report, the Infringed Java Copyrights provided Google with very significant and valuable benefits including, but not necessarily limited to: 1) credibility with key launch business partners—carriers and OEMs; 2) faster time to market; 3) access to a large Java developer network; 4) stability and reliability.<sup>379</sup> In addition, as discussed in my Initial Report and herein, the technical centrality analysis performed by Dr. Kemerer demonstrates that the lines of code associated with the Java APIs are more significant than the other Android API lines of code. This centrality analysis alone shows that a lines of code comparison is an inappropriate measure of value.
271. As discussed in Section 4.5 and Section 4.6, I believe Dr. Leonard's approaches to apportioning Google's causally connected profits are fundamentally flawed, and therefore unreliable. Thus, I have prepared an alternative apportionment analysis that is set forth in the following section.

## **7.2 Profits Apportioned to the Android Platform and Therefore to the Java APIs**

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### **7.2.1 Commingling Theory and Legal Basis for Claiming 100% of Platform Contribution**

272. As discussed previously, my apportionment analysis is consistent with the application of the legal theory of commingling and is therefore based on 100% of the value of the Platform Contribution. I find application of that legal theory would be appropriate in this case because Google knowingly assumed the risk of its failure to obtain a license and created the scenario whereby the relative contributions of the Java APIs to the total Platform Contribution are extremely difficult, if not impossible, to discern with reasonable certainty. My opinion is also consistent with the overall business circumstances. As previously described, Google faced an extremely competitive landscape with a very limited window of opportunity, and had to obtain the cooperation of numerous other mobile industry participants in order to make a successful launch of the Android Platform. Those industry participants were familiar with (and comfortable with) Java in mobile phones. Java represented a significant portion of the market at the time, and Google overtly capitalized upon that familiarity and comfort with the very important audience of carriers and OEMs. Furthermore, the technical expert evidence also shows that Android is dependent upon the Java APIs, that the Java APIs provided stability to the Android Platform during the critical launch period, and that the Java APIs are centrally important to the Android Platform and its most popular applications. Under these circumstances, use of the commingling standard is appropriate because the Java APIs are properly viewed as a "gating item" to the Android Platform.

### **7.2.2 Infringed Java Copyrights Enabled the Realization of Android Revenues**

273. As summarized in Exhibit 8, the Infringed Java Copyrights enabled the realization of revenue from advertising, the sale of Application, the sale of Digital Content, and the sale of Hardware.

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<sup>379</sup> Expert Report of James E. Malackowski, January 8, 2016, pp. 86 to 93



### 7.2.2.1 Search, AdSense and Display Ad Revenues

274. Revised Exhibit 8.1 summarizes the annual Advertising Revenue Google realized from Android devices for the period 2008 through 2015.<sup>380</sup> As Revised Exhibit 8.1 illustrates, Google realized \$29.0 billion in Ad Revenue during that eight-year period. The Leonard Report reflects the same \$29.0 billion total, however, Dr. Leonard allocated Ad Revenue among Search, AdSense and Display for the four-year period 2008 to 2011. In Revised 8.1, I have updated my summary of Android Advertising Revenue to reflect Dr. Leonard's disclosures relating to the years 2008 to 2011.
275. As reflected in Revised Exhibit 8.1, the Advertising Revenue Google realized from Android devices grew from \$0.7 million in 2008, to an annualized total of [REDACTED] in 2015, and total [REDACTED] Search (AdWords) led with [REDACTED] followed by Display with [REDACTED], and AdSense with [REDACTED] during this eight-year time period.

### 7.2.2.2 Application and Digital Content Revenues

276. Google began selling Apps through Android Market/Google Play in 2009. Exhibit 8 reflects Google's 30 percent share<sup>381</sup> of total revenue from sales of paid-for-Apps downloaded from Android Market/Google Play, which 30 percent share totals \$8.0 billion during the eight-year period 2008 to 2015.
277. Google began selling music, movies and other Digital Content through Android Market/Google Play in 2011. Exhibit 8 reflects 100 percent of the \$1.7 billion of revenue from downloaded Digital Content through Android Market/Google Play for the years 2011 to 2015.<sup>382</sup>

### 7.2.2.3 Android Devices including Nexus Smartphones (\$2.0B)

278. Google began selling Nexus devices in 2010. Exhibit 8 reflects to \$2.0 billion of revenue Google realized from sales of Nexus phones, tablets, watches and accessories<sup>383</sup> for the years 2010 to 2015.

## 7.2.3 Platform Contribution

279. Revised Exhibit 7 summarizes the profit Google realized through the Android platform during the period 2008 through 2015. As that Exhibit illustrates, from 2008 through 2015, Google realized \$19.9 billion of profit from the Android platform during that eight-year time period. Revised Exhibit 7 reflects total TAC of \$6.3 billion. This total is \$1.5 billion higher than the total reflected in Exhibit 7 to my Initial Report, and reflects the annual estimates of Android TAC calculated in

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<sup>380</sup> Since my initial report, I understand that Jonathan Gold was deposed for a second day. I understand that during that second day, he prepared a chart of Google's Android-related revenues. Deposition of Jonathan Gold, January 29, 2016; Deposition Ex. 5119.

<sup>381</sup> Google shares App Revenue with App developers. Deposition of Jonathan Gold, December 11, 2005, p. 73.

<sup>382</sup> Deposition of Jonathan Gold, December 11, 2015, pp. 38–39, 72.

<sup>383</sup> Deposition of Jonathan Gold, December 11, 2015, p. 70.



Exhibit 7.2 for the years 2011 to 2015. I made this revision to ensure my TAC calculation was specific to the revenue streams at issue.

280. The Figure below is a summary of the analysis I performed to identify the portion of the profits Google realized through Android devices that is attributed to the Android platform, and therefore to the Java APIs.

**Figure 12**  
**Profit Apportioned to Infringed Java Copyrights**

Apportionment of Android Related Profit	Amount (in millions)
Gross Profit of Android Ad Revenues	\$22,626.7
Platform Contribution Factor	35.6%
Advertising Gross Profit Apportioned to Platform	\$8,065.4
Plus: Gross Profit of Other Android Revenue	\$3,415.9
Less: Android Sales and Marketing Expense	-\$2,651.9
Profits Apportioned to Infringed Java Copyrights	<u>\$8,829.4</u>

#### 7.2.3.1 Advertising Gross Profit Apportioned to Platform (And Therefore Infringed Java Copyrights)

281. As discussed above, in response to an Order regarding an Oracle Motion to Compel,<sup>384</sup> Google produced Google's Non-Android Mobile O.S. Partner List. For six Google non-Android Mobile O.S. Partners, this document provides: 1) the percentage of Search Revenue Google shares with the partner; 2) the total gross revenue earned by Google under the agreement; and 3) the Google search services which are the subject of each agreement. **Exhibit 7.6** is a calculation of the weighted average percent of Search Revenue which Google shares with all six Partners reflected in Google's Non-Android Mobile O.S. Partner List. **Exhibit 7.6** indicates that since 2006, Google has paid to non-Android Mobile Operating System Partners, 35.6 percent of the Search/Ad Revenue it earns from the mobile devices of those partners.
282. This factor of 35.6 percent represents an agreed-upon measure by Google and other disinterested third parties as to the value that the platform plays in generating the advertising revenue. Google agrees to pay the other non-Android mobile platform providers their share of the value generated by the advertising for their platforms.
283. When applied to Google's advertising revenues, this factor of 35.6 percent fairly represents the Android platform contribution to Google's mobile advertising business strategy. In the Figure above, I apply this factor to the gross profit from Android Ad Revenue of \$22.6 billion to

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<sup>384</sup> Order Re: Motion to Compel, 3:10-cv-03561-WHA, Docket No. 1436, January 20, 2016, p. 1..



determine the Ad Revenue attributed to the Android platform. As the Figure illustrates, \$8.1 billion of Android Ad Revenue is apportioned to the Android platform.

284. The remaining amount after applying the Platform Contribution Factor is not included in the disgorgement calculation. By giving Google credit for the other 64 percent of the profits, Google is receiving the value of its contributions for its advertising display network, its search engine, its branding and the other elements of value I identified in my Initial Report.
285. When it comes to the Platform, however, I have not further subdivided the value between the Infringed Java Copyrights and the Google contribution. As the technical analysis of Dr. Schmidt reveals, Google appears to have contributed only 26 percent of the code to the Platform and borrowed the remainder. On the other hand, Sun and Oracle unwillingly contributed code that turned out to be of vital importance to the Android Platform. This is where Google's commingling makes it extremely difficult to separate out the items of value. And, this is also where I have applied my judgment as an expert in light of the business circumstances that Google faced at the time to determine that the Java APIs were a gating item to the successful launch of the Android platform. In light of that significance, it is in my opinion appropriate to credit the Infringed Java Copyrights with the entire value of the Platform Contribution. Any other calculation risks allowing Google to retain a substantial portion of profits generated by the Infringed Java Copyrights.

#### **7.2.3.2 Gross Profit of Other Android Revenue**

286. 100 percent of the gross profit Google realized from Applications and Digital Content sold through Android Market/Google Play and 100 percent of the loss from sales of Android Hardware is attributed to the Android platform. **Exhibit 7.7** provides the calculation for the \$3.4 billion figure reflected in the previous Figure. As **Exhibit 7.7** illustrates, included within this calculation is \$1.0 billion of Infrastructure and Other Cost of Sales.
287. The reason that 100 percent is credited to the Platform in these line items is because Google has already split the value of these revenues with its business partners, and therefore has obtained only that share they have determined represent its contribution. So, for example, the app developers publishing applications in the Google Play Store pay 30 percent to Google for its contribution. In my view, these agreements are a reasonable proxy for the platform contribution in the case of these lines of business.
288. As before, and for the same reasons explained above, I have not further subdivided the Platform Contribution. Indeed, given the dependency of popular Android applications on the Java APIs, one could certainly make the case that the contribution is even stronger with respect to these lines of business. However, my calculation does not expect Google to disgorge profits it did not realize.

#### **7.2.3.3 Certain Android Expenses**

289. As reflected in the above Figure, 100 percent of Google's Sales and Marketing related operating expenses have been attributed to the Android platform.



290. The Google reported operating results for the Android platform summarized in Revised Exhibit 7 includes Android related Research and Development (“R&D”) and Legal Expenses. As part of my calculation of Platform Contribution, I have excluded these expenses.
291. In the case of \$889 million in legal expenses,<sup>385</sup> I do not consider it appropriate to deduct these expenses. I was willing to provisionally include them in my initial profit calculations pending an explanation by Google. However, Dr. Leonard’s report contains no basis for concluding that these expenses are variable with respect to producing the revenue at issue, as the Court has required. Deducting these expenses is also the equivalent of making Oracle pay a share of these expenses, which may be improper.
292. The same is true of R&D expenses. While I provisionally included them in my Initial Report, Dr. Leonard’s report offers no evidence demonstrating that they are variable rather than fixed expenses as required by the Court. I therefore removed the R&D costs in making my apportionment calculation. Further, I consider the costs Google incurred in connection with Android R&D to be an investment by Google. Even assuming Google is required to stop infringing the Java APIs, it does not lose the value of this investment. Google is not likely to entirely abandon the Android platform when it has 1.5 billion active users continuing to generate revenue. Treating this R&D expense as a capital expenditure in this context makes it the economic equivalent of an asset that Google will retain. Even if Google stops infringing, Oracle does not receive this asset. Oracle therefore should not pay for the asset. As reflected in Revised Exhibit 7, over the period 2008 to 2015, Google invested more than \$2.6 billion in R&D in connection with the Android platform.

#### **7.2.3.4 Profit Apportioned to Infringed Java Copyrights**

293. As illustrated in the Figure above, I attribute to the Android platform, and therefore to the Infringed Java Copyrights, \$8.8 billion of the \$19.9 billion of total profit Google reported to have realized from the Android Platform during the years 2008 to 2015.
294. Google would face no financial difficulty if asked to disgorge this sum, as its public financial reports indicate that it possesses cash, cash equivalents and marketable securities exceeding \$73 billion.<sup>386</sup>

#### **7.2.4 Costs, Expenses and other Business Factors Considered**

295. I have accounted for or otherwise considered the contribution of factors other than the Infringed Java Copyrights to the Android Platform. The specific costs, expenses, and other business factors I have considered in connection with my analysis include the following:

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<sup>385</sup> Expert Report of Dr. Leonard, February 8, 2016, Exhibit 1a.1, Note 4.

<sup>386</sup> Alphabet Inc., 2015 Form 10-K.



#### **7.2.4.1 Cost of Sales**

296. The TAC Google incurred in connection with the AdSense and Display advertising programs is captured in the “Gross Profit from Android Ad Revenues” line item in the Figure above. The TAC Google incurs in connection with the AdWords (Search) advertising program is recorded by Google in App and Digital Content Cost of Sales, and is thus captured in the “Gross Profit of Other Android Revenue” line item of the above Figure.
297. The Cost of Sales of Apps, Digital Content and Hardware, including Infrastructure and Other Cost of Sales, is likewise captured in the “Gross Profit of Other Android Revenue” line item of the Figure above. Thus, I have considered and accounted for every Cost of Sale reported by Google as incurred in connection with the development and commercialization of the Android platform.

#### **7.2.4.2 R&D Costs**

298. As discussed above, I consider Google’s \$2.6 billion R&D investment to be an investment which represents the value Google attributed to the Android platform.

#### **7.2.4.3 Manufacturing Facilities and Other Tangible Assets**

299. As discussed herein, as well as in my Initial Report, Google open sourced the Android source code which incentivized OEMs around the world to manufacture mobile devices that utilize the Android operating system. By doing so, Google accelerated its market entry while saving potentially billions of dollars of manufacturing-related expenditures.
300. The Infrastructure and Other Cost of Sales line item reflected in Revised Exhibit 7 is captured in the Figure above as part of “Gross Profit of Other Android Revenue.” According to Mr. Jonathan Gold, Infrastructure and Other Cost of Sales includes the cost of items used by Google in the manufacturing and shipping of Android-related products and services, including such things as Google laptop computers for employees associated with customer support and “payment processing.”<sup>387</sup> Thus, I accounted for or otherwise considered all of Google’s capital expenditures relating to the development and commercialization of the Android platform.

#### **7.2.4.4 Retail Sales Expenses**

301. Google entered into agreements with wireless carriers such as T-Mobile, Vodafone, NTT DoCoMo and Verizon to provide incentives to adopt the Android operating system for devices compatible with their wireless networks.<sup>388</sup> In so doing, Google established retail outlets for its Android devices, and avoided the high cost of buying or renting retail space around the Country and around the world, as well as the cost of employing and training retail sales representatives.

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<sup>387</sup> Deposition of Jonathan Gold, December 11, 2015, pp. 107 – 108, 126.

<sup>388</sup> GOOGLE-12-00134317 (Google internal email forwarding 11/6/2007 WSJ discussing OHA announcement and Google deals with HTC, Samsung, Motorola, T-Mobile, Sprint, Nextel, NTT DoCoMo).



#### 7.2.4.5 Sales and Marketing Expense

302. Revised Exhibit 7 reflects the Sales Expense of \$412 million, and Marketing Expense of \$2.2 billion that Google reported as relating to the commercialization of the Android platform. These expenses are captured in the Figure above.
303. A May 2015 Google presentation entitled “Introduction to Android,” indicates that Google expected to pay [REDACTED] in 2015 to its Android carrier Distribution Partners, OEMs, and Retail Partners through revenue-sharing agreements, channel incentives, and rent.<sup>389</sup> According to Mr. Gold, to the extent Google actually incurred these costs in 2015, they are recorded as App Cost of Sales, Digital Content Cost of Sales, and likely Sales Expense and Marketing Expense.<sup>390</sup> Because these costs are all captured in Revised Exhibit 7 as well as in the Figure above, I have accounted for and otherwise considered all costs associated with the sales and marketing of Android devices.

#### 7.2.4.6 Legal Expenses

304. During the eight-year period 2008 to 2015, Google reported Android-related legal expenses not relating to this matter of \$889.3 million. These expenses are reflected in Revised Exhibit 7. Due to the unknown nature of these expenses, I do not attribute them to the Android platform in the Figure above. Thus, I have accounted for or otherwise considered this and every other Operating Expense Google reported as relating to the Android platform in its contemporary business records.

#### 7.2.4.7 Conclusion Concerning Value of the Infringed Java Copyrights

305. I have considered all of the costs and expenses Google reported as having been incurred in connection with the research, development and commercialization of the Android platform. In the Figure below, these costs and expenses are deducted from the Ad Revenues apportioned to the Android platform, as well as revenues from sales of Applications, Digital Content, and Hardware. This results in \$8.8 billion of profit attributed to the Infringed Java Copyrights.

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<sup>389</sup> GOOG-00130338 – 386 at 340.

<sup>390</sup> Exhibit 7 of my Initial Report.



**Figure 13**  
**Profits Apportioned to Infringed Java Copyrights**

<b>Apportionment of Android Related Profit</b>	<b>Amount (in millions)</b>
Gross Profit of Android Ad Revenues	\$22,626.7
Platform Contribution Factor	<u>35.6%</u>
Advertising Gross Profit Apportioned to Platform	\$8,065.4
Plus: Gross Profit of Other Android Revenue	\$3,415.9
Less: Android Sales and Marketing Expense	<u>-\$2,651.9</u>
Profits Apportioned to Infringed Java Copyrights	<u><u>\$8,829.4</u></u>

## 8. STATUTORY DAMAGES

306. In my Initial Report, I calculated statutory damages relating to four copyrighted works. Based on the Court's Order Re Google's Motion To Strike dated February 5, 2016, I understand only the following two copyrighted works remain at issue in this case.
- Certificate of Registration, Java 2 Standard Edition 1.4, TX0006196514, Trial Ex. 464;
  - Certificate of Registration, Java 2 Standard Edition 5.0, TX0006066538, Trial Ex. 475;
307. Pursuant to the Copyright Act, Oracle is entitled to one award of statutory damages per work for Google's infringement, ranging from \$750-\$30,000 per work for non-willful infringement. For willful infringement, Oracle may be awarded up to \$150,000 per work.
308. I have been asked, based on my professional experience and in light of the available evidence, to calculate the appropriate statutory damages figure. I understand that Oracle may elect to receive statutory damages under the Copyright Act instead of actual damages and disgorgement of profits.
309. It remains my opinion that, based on my review of evidence, that due to the significant lost opportunity costs to Oracle arising from Google's infringement of the copyrighted Java works (as set forth herein) and the magnitude of the benefit obtained by Google as a result of their copying of the works (also as set forth in this report), the benefits to Google far exceed the available statutory range, and thus Oracle should be awarded the maximum amount available under the statute.
310. If Google's infringement is not found to be willful, Oracle should be awarded statutory damages of \$30,000 per work for a total of \$60,000.
311. If Google's infringement is found to be willful, Oracle should be awarded statutory damages in the amount of \$150,000 per work for a total of \$300,000.



**9. PREJUDGMENT INTEREST**

312. From an economic analysis standpoint, a time-value-of-money award would be necessary to compensate Oracle for the loss of use of funds during the damages period. However, I understand that an award of prejudgment interest is a legal matter and that the Court has substantial discretion in determining the interest rate and compounding method to be awarded. I have not prepared any prejudgment interest calculations as of this date, but am prepared to do so if requested by the Court.

**10. SIGNATURE**

313. I declare under penalty of perjury that the forgoing is a true and correct summary of my opinions in this matter,

A handwritten signature in black ink, appearing to read "James E. Malackowski".

James E. Malackowski

February 29, 2016

Date



OCEAN TOMO®  
INTELLECTUAL CAPITAL EQUITY®

February 6, 2016

## JAMES E. MALACKOWSKI CURRICULUM VITAE

**James E. Malackowski** is the Chairman and Chief Executive Officer of Ocean Tomo, LLC, the Intellectual Capital Merchant Banc™ firm providing industry leading financial products and services related to intellectual property including financial expert testimony, valuation, strategy consulting, proprietary research products, investment services, risk management products, innovation management services and transaction brokerage. Ocean Tomo assists clients – corporations, law firms, governments and institutional investors – in realizing Intellectual Capital Equity® value broadly defined. Subsidiaries of Ocean Tomo include: Ocean Tomo Risk Management, LLC; Ocean Tomo Asset Management LLC; OTI Data Networks, LLC; Patent Marking, LLC; and Ocean Tomo Capital, LLC – publisher of the Ocean Tomo 300® Patent Index family (NYSE: OTPAT) and Ocean Tomo Investments Group, LLC, a registered broker dealer. Ocean Tomo is the creator of the live public open cry auction marketplace for intellectual property and the exclusive source for Ocean Tomo Ratings™.

Mr. Malackowski is a founding and continuous member of the IP Hall of Fame Academy. He has been recognized annually since 2007 by leading industry publications as one of the ‘World’s Leading IP Strategists’. Significantly, Mr. Malackowski is listed among “50 Under 45” by *IP Law & Business*™; included in the *National Law Journal*’s inaugural list of 50 Intellectual Property Trailblazers & Pioneers; and, named as one of “The Most Influential People in IP” by *Managing Intellectual Property*™. Mr. Malackowski was named as 1 of 50 individuals, companies and institutions that framed the first 50 issues of *IAM Magazine* as well as 1 of 60 leading global Economics Expert Witnesses by the same publication in 2014. In 2011 Mr. Malackowski was selected by the World Economic Forum as one of less than twenty members of the Network of Global Agenda Councils to focus on questions of IP policy. In 2013 he was inducted into the Chicago Area Entrepreneurship Hall of Fame by the Institute for Entrepreneurial Studies at the University of Illinois at Chicago College of Business Administration.

Mr. Malackowski has advised clients and counsel on business valuation issues as well as all phases of the technology transfer process. He has substantial experience as a Board Director for leading technology corporations and research organizations as well as companies with critical brand management issues. He is Past President of The Licensing Executives Society International, Inc. as well as its largest chapter, LES USA & Canada, Inc. Today, Mr. Malackowski focuses his non-for-profit efforts with organizations leveraging science and innovation for the benefit of children, including those located in lesser developed countries. He is a Director of the Stanley Manne Children’s Research Institute and has served since 2002 as a Trustee or Director of Invent Now, Inc., an organization providing summer enrichment programs for more than 90,000 students annually. He is the Founder of the Chicago based Center for Applied Innovation (CAI), an Illinois non-for-profit corporation created to manage education, public policy outreach and related economic activity around applied technology and intellectual property rights.

Mr. Malackowski is a frequent speaker on emerging technology markets and related financial measures. He has addressed mass media audiences including Bloomberg Morning Call, Bloomberg Evening Market Pulse, Bloomberg Final Word, CNBC Closing Bell, CNBC On the Money, CNBC Street Signs, CBS News Radio and Fox Business National Television as well as other recognized news-based internet video channels. Mr. Malackowski is a judge on behalf of the Illinois Technology Association’s CityLIGHTS™ Innovation Awards program and has also appeared as a judge on PBS’s *Everyday Edisons*.



On more than fifty occasions, Mr. Malackowski has served as an expert in U.S. Federal Court, U.S. Bankruptcy Court, State Court, the Ontario Superior Court of Justice or the International Trade Commission on questions relating to intellectual property economics including the subject of business valuation, reasonable royalty, lost profits, price erosion, commercial success, corrective advertising, creditor allocations, Hatch Waxman Act market exclusivity, business significance of licensing terms including RAND obligations, and equities of a potential injunction. As an inventor, Mr. Malackowski has more than twenty issued U.S. patents. He is a frequent instructor for graduate studies on IP management and markets and a Summa Cum Laude graduate of the University of Notre Dame majoring in accountancy and philosophy. Mr. Malackowski is Certified in Financial Forensics, a Certified Licensing Professional and a Registered Certified Public Accountant in the State of Illinois.

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**PRINCIPAL  
EXPERIENCE**

Co-Founder, Chairman and Chief Executive Officer, *Ocean Tomo, LLC*, July 1, 2003 to present. Mr. Malackowski is responsible for all aspects of the firm's merchant banking practice.

Founder and Chairman, *3Discovered, LLC*. The company was formed as a collaborative venture between Ocean Tomo, LLC and Liberty Advisor Group in 2013. 3Discovered is a current portfolio company of US-based venture capital firm AITV.

Founder, *The Intellectual Property Exchange International, Inc.* Mr. Malackowski guided initial product development of IPXI and recruitment of executive management. In 2011, IPXI was funded by an industry consortium including the Chicago Board Options Exchange. Mr. Malackowski was the Chair or Co-Chair of the Exchange from inception to February 26, 2015.

President and Chief Executive Officer, *IP Equity Management, LLC*, doing business as Duff & Phelps Capital Partners, March 1, 2002 to June 30, 2003. The firm's intellectual property structured finance efforts were consolidated with Ocean Tomo on July 1, 2003.

Principal and Founder, *VIGIC Services, LLC*, July 1, 2000 to February 28, 2002. Mr. Malackowski identified and evaluated intellectual capital based private equity investment opportunities and served as an advisor to four completed transactions.

Principal and co-Founder, *IPC Group LLC*, August 1, 1988 – June 30, 2000. Mr. Malackowski also held the offices of President and CEO and was a Board member / chairman of the firm. Along with four co-founders, Mr. Malackowski grew IPC Group to become the largest professional services firm specializing in intellectual property valuation and strategy consulting. IPC Group was sold in 1999 later changing its name to InteCap.

Executive Consultant, *Peterson & Co. Consulting*, Chicago, June 3, 1985 – July 30, 1988. Mr. Malackowski began with Peterson as a Staff Consultant and was the firm's quickest promotion to both Senior Consultant and Executive Consultant. Mr. Malackowski helped to establish the firm's intellectual property litigation and valuation practice. Peterson & Co. was sold to Saatchi & Saatchi PLC in 1988.



Chairman and CEO, *JEMAN Technologies, Inc.* 1995 – 1999. Mr. Malackowski led the company's efforts to develop new technologies related to wireless direct response services. JEMAN was sold to ewireless, Inc. in 1999 as part of a venture transaction funded by Bedrock Capital Partners and Tredegar Investments.

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**NON-PROFIT AND  
ASSOCIATION  
EXPERIENCE**

Mr. Malackowski has been active in The Licensing Executives Society (LES) locally, nationally and internationally. LES is the premiere global professional association of technology transfer and intellectual asset management professionals with more than 10,000 members in more than 32 countries.

Mr. Malackowski is Past President of the Licensing Executives Society International, LLC, where his experience included the following positions:

- Chair, Past President's Council (2012 – 2013)
- President and Member of the Board (2011 - 2012)
- President Elect and Member of the Board (2010 - 2011)
- Secretary and Member of the Board (2007 - 2010)
- Member and Permanent Alternate, Board of Delegates (1992 - 2005)
- Past Chair, Membership, Investment, Education, Long-range Planning and Global Technology Impact Forum Committees.

Mr. Malackowski's term as President of LESI has been recognized for creation of the LESI Global Technology Impact Forum and concurrent Invent For Humanity™ Technology Transfer Exchange Fair; formalizing the National Presidents' Council; establishing the position of a permanent Executive Director; and, restructuring the leadership of LESI committees utilizing a Chair, Past Chair, Chair Elect ladder combined with functional responsibilities for committee Vice Chairs. This later organizational stamp is based largely on Mr. Malackowski's experience as President of LES USA & Canada described below where he led a restructuring of the Board from a regional to a functional focus for each officer and Trustee. As with his tenure at his national Society discussed below, Mr. Malackowski led a financial turn-around returning LESI to positive cash flow following its' only two years of loss.

Mr. Malackowski is also Past President of The Licensing Executives Society (USA and Canada), Inc. where he held numerous offices in the organization including:

- President and Member of the Board (2001 – 2002)
- International Vice President and Member of the Board (2000)
- Treasurer and Member of the Board (1996 -- 1999)
- Trustee and Member of the Board (1992 – 1996)
- Chair, Annual Meeting in Miami Beach (1998) and the Summer Meeting in Chicago (1997)

Mr. Malackowski presided over a restructuring of the LES USA & Canada Board and a financial turn-around returning the organization to positive cash



flow following its only two years of loss. Mr. Malackowski is the youngest President to hold office at LES USA & Canada as well as at LES International.

In 2007, Mr. Malackowski was the Founding Chair of the Board of Governors for what is now Certified Licensing Professionals, Inc., administrator of the Certified Licensing Professional (CLP) program for professionals in the fields of licensing, business development and commercialization of intellectual property. More than 1,000 individuals involved in patenting, marketing, valuation, IP law, negotiation, and intellectual asset management have earned the CLP certification. CLP, Inc. is a 501(c)(6) organization whose mission is to elevate the licensing profession through knowledge and standards.

Mr. Malackowski extends significant time to non-profit activities directed towards a further understanding of the economic importance of innovation and intellectual property, in both the United States and developing economies. These efforts include:

- Judge, Illinois Technology Association, CityLIGHTS™ Innovation Awards (2013 - )
- Member, World Economic Forum Network of Global Agenda Councils (2011 - 2012)
- Director, International Intellectual Property Institute, Washington D.C., (2002 - 2007)
- Resident Advisor, U.S. Information Agency, (1999)
- Resident Advisor, U.S. Department of Commerce Commercial Law and Development Program (1997)
- Founder and Chairman, The Center for Applied Innovation, Inc. (2004 - )

In addition to his University instruction described herein, Mr. Malackowski focuses his non-for-profit efforts with those organizations leveraging science and innovation for the benefit of children.

- Director, Children's Research Fund (2013); Co-Chair Annual Fund Campaign (2013)
- Director, Invent Now, Inc. (2006 - ); Trustee and Director, National Inventors Hall of Fame, Inc. (2001 - 2006); and, Member, NIHF Board Finance Committee (2006 - ). These organizations provide summer enrichment programs for more than 90,000 students annually including [Camp Invention™](#) for kids in grades 1-6 (and their parents and teachers); [Collegiate Inventors Competition™](#) for college students (and their mentors); and, [Club Invention™](#) for kids in grades 1-6 (and their parents and teachers).
- President's Council, Chicago Museum of Science and Industry (2005 - 2011) including participation on the Education Advisory Committee (2007 - 2009) and the Alternative Revenue Committee (2008 - 2011)
- Director, Stanley Manne Children's Research Institute (2009 - 2018) including Chair of the Board's Technology Transfer Committee (2014 - ) and the Strategic Planning Resources Committee (2011 - 2012)

Mr. Malackowski is the Founder of the Center for Applied Innovation, a Chicago based non-for-profit with both local and international programs. CAI



was created to manage education, public policy outreach and related economic activity around applied technology and intellectual property (IP) rights in the State of Illinois and around the world.

- CAI created and patented the first commoditized contract for technology licensing, the Unit License Right™. This innovation has been licensed to the Chicago-based Intellectual Property Exchange International.
- Under Mr. Malackowski's continued leadership as Chairman, CAI organizes the Invent for Humanity™ Technology Transfer Exchange Fair (InventforHumanity.org) launched in January, 2012, in Geneva, Switzerland. Invent for Humanity showcases field-ready, sustainable innovations, known as "appropriate technologies", leveraging the experience of licensing professionals to match and structure the actual transfer of such technology to meet recognized needs of emerging market economies.

Mr. Malackowski's association and non-profit activities are informed in part by his participation in the Harvard Business School Executive Education Program on Governing for Nonprofit Excellence, November 2000.

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#### **RELATED OFFICES**

Berg, LLC, Member, Council of Advisors, Senior Advisor, Intellectual Property Licensing & Innovation (2012 - )

Curious Networks, Inc., Director, (1999 - 2000), Co-Chair of the Board's Strategic Partnership Committee. Mr. Malackowski led the company's first and second round of venture funding.

ewireless, Inc. (f/k/a JEMAN Holdings, Inc. d/b/a Cellular Linking), Director, (1995-1999, 2000-2002)

Ford Global Technologies, Inc., Ford Motor Company, Director (1997 - 2001). Mr. Malackowski advised Ford Motor Company on the original business strategy which led to the formation of FGTL. FGTL was the largest known technology management company in the United States during Mr. Malackowski's term.

Infocast, Corporation (OTC BB: IFCC.OB), Director (2001-2002). Member of the Audit and Compensation Committees. Mr. Malackowski led the transition of the company's senior management team and continued U.S. based funding efforts.

Insignis, Inc., Director (2000 - 2002) Mr. Malackowski led the company's first round of venture funding. Insignis is a Chicago based provider of institutional financial data services.

Solutionary, Inc., Director (2000 - 2013). Arranged and advised on Solutionary's asset acquisition of S3Networks effective August 31, 2001 and sale to strategic buyer in 2013. Member of the Board's Compensation Committee.



TuShare, LLC, Advisor (2012 - )

422, Inc., Director (2002 - 2003)

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**EDUCATION AND  
CERTIFICATION**

University of Notre Dame, B.B.A., Bachelor of Business Administration with majors in Accountancy and Philosophy. Graduated Summa Cum Laude, 1985.

Registered Certified Public Accountant, State of Illinois Certificate Number 41,187 issued January 16, 1986; License No. 239.007831; Expires September 30, 2018.

Certified Licensing Professional, Certificate Number 1606 issued July 1, 2008; Expires June 30, 2017.

Certified in Financial Forensics, CFF<sup>TM</sup>, American Institute of Certified Public Accountants, Certificate Number 391 issued July 31, 2008; Expires December 31, 2014.

Accredited in Business Valuation, ABV<sup>TM</sup>, American Institute of Certified Public Accountants, Certificate Number 4278 issued May 31, 2014.

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**UNIVERSITY  
INSTRUCTION**

John Marshall Law School, Intellectual Property Damages (1992 - 1994)

DePaul University, Intellectual Property Entrepreneurial Finance (2003)

The George Washington University Law School, Intellectual Property Management (2004)

The University of Chicago Graduate School of Business:

- Intellectual Property Investment (2004 - 2006)
- Entrepreneurial Discovery, MBA Course 34705, Adjunct Professors Mark Tebbe and Brian Coe (Fall 2014 - 2015)

Indiana University Kelly School of Business, Intellectual Property Finance (2005)

University of Notre Dame, Mendoza College of Business, Adjunct Instructor:

- MBA Interterm Intensives, Intellectual Property Based Market Transactions, Valuation and Trading (Fall 2006, Fall 2008)
- MBA Executive Program, Course MBAE 70639, Intellectual Property, (Spring Semester 2008)
- MBA Program, Litigation Support and Valuation (Spring 2009)

University of California at Berkeley Haas School of Business, Innovation Markets (2008)



Chicago-Kent College of Law, Adjunct Professor of Law, IP Financial Markets and Legal Principles (Fall 2008)

Rutgers Professional Science Master's Program, Fundamentals of Intellectual Property (Summer 2011)

Northwestern University Kellogg School of Management, MGMT 441-61 and MGMT 441-76 Intellectual Property Management, Clinical Professor James G. Conley (Fall 2012, Spring 2013, Spring 2014, Spring 2015)

University of Texas McCombs School of Business, MBA Course: Open Innovation, Professor Sirkka Jarvenpaa (Spring 2013)

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**ACTIVE  
MEMBERSHIPS**

American Institute of Certified Public Accountants, Member 01182237 (1985 -)  
The Economic Club of Chicago (1990 - )  
The Licensing Executives Society (1988 - )  
Young Presidents' Organization - World President's Organization (2006 - )

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**RECOGNITION  
AND AWARDS**

Individually, Mr. Malackowski has been recognized for his expertise as well as his work in developing markets for intellectual property transfer including:

- Named to the *National Law Journal's* inaugural list of 50 Intellectual Property Trailblazers & Pioneers. (August 2014)
- Named as 1 of 60 leading global Economics Expert Witnesses in the *IAM Patent 1000*, *IAM Magazine*. Selection based on interviews by IAM researchers with more than 100 patent litigators. (May 2014)
- Inductee, Chicago Area Entrepreneurship Hall of Fame as selected by the Institute for Entrepreneurial Studies at the University of Illinois at Chicago College of Business Administration, (2013; 28<sup>th</sup> Year of Program)
- Named as 1 of 50 Individuals, Companies and Institutions that Framed the First 50 Issues of *IAM Magazine*, November / December 2011.
- "IP Personalities of 2008", *IAM blog* by Joff Wild, Editor
- "IAM Strategy 300: The World's Leading IP Strategists", *IAM Magazine* (2012-2015)
- "IAM Patent 1000: The World's Leading Patent Professionals", *IAM Magazine* (2015)
- "World's 250 Leading IP Strategists", *IAM Magazine* (2009-2011)
- "50 Under 45", *IP Law & Business*<sup>TM</sup> (2008)
- "The Most Influential People in IP", *Managing Intellectual Property*<sup>TM</sup> (2007)
- Member, IP Hall of Fame Academy (2007- )
- Mediator and Arbitrator, World Intellectual Property Organization, (1994)

Ocean Tomo as a firm has been likewise recognized for its accomplishments including:



- Ocean Tomo was recognized as a member of the *2015 Inc.5000®* list of fastest-growing private companies in America.
- Ocean Tomo was honored in 2011 with the “Best of Chicago Award in Investment Advisory Services” by the U.S. Commerce Association (USCA).
- In addition to Mr. Malackowski, Ocean Tomo as a firm was named as 1 of 50 Individuals, Companies and Institutions that Framed the First 50 Issues of *IAM Magazine*, November / December 2011 and the only firm other than Microsoft (2 of 50 mentions) to be recognized multiple times (5 of 50 mentions).
- The firm’s Chicago office was presented the *2011 Alfred P. Sloan Awards for Business Excellence in Workplace Flexibility* after having been finalist for scoring in the top 20% of all firm’s measured nationally.
- Ocean Tomo was recognized in 2010 by Corporate Voices for Working Families for its work-life balance as part of the National Workplace Flexibility Campaign published by *USA Today*.
- Ocean Tomo was recognized as a juried Finalist for the Illinois Technology Association 2010 CityLIGHTS Award for raising the stature of the Illinois technology industry.
- Selected as case study organization for Haas School of Business, University of California, Berkeley (2009)
- Selected as case study organization for Harvard Business School MBA Program (2008)
- Ocean Tomo was named one of 20 small and mid-sized firms recognized as the “Best Places to Work in Illinois” by Best Companies Group in a competition sponsored by the Illinois Chamber of Commerce and the Illinois State Council Society for Human Resource (2007)
- Ocean Tomo Auctions received the 2006 Chicago Innovation Award for most innovative new product or service introduced between January 1, 2005, and July 31, 2006, that uniquely satisfied unmet needs in the marketplace. The award was presented by Kuczmarski & Associates and the *Chicago Sun-Times*.
- Ocean Tomo Auctions was awarded the Department of Commerce Technology Administration & National Knowledge & Intellectual Property Management 2006 Innovator of the Year Award.
- Ocean Tomo was recognized as a “Top Ten IP Newsmakers of 2006” by *IP Law & Business*, Almanac 2006.

Numerous authors and graduate business programs have written case studies about Ocean Tomo and its affiliates including:

- Piscione, Deborah Perry, *The Risk Factor*, Copyright 2014.
- Houle, David, *Entering the Shift Age*, Copyright 2013.
- Kuczmarski, Thomas D., Dan Miller and Luke Tanen, *Innovating Chicago-Style: How Local Innovators Are Building The National Economy*, Copyright 2012.
- Houle, David, *The Shift Age*, Copyright 2007.
- Chesbrough, Henry, *Open Business Models: How to Thrive in the New Innovation Landscape*, Copyright 2006.
- Harvard Business School Case Study
- University of California Business School Case Study



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**RELATED U.S.  
SPEECHES AND  
PUBLICATIONS**

“The Determination of a Reasonable Royalty: Hypothetical Negotiation v. A General License Agreement”, The Licensing Executives Society, Chicago Chapter, December 8, 1987.

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Money Suite Company v. Insurance Answer Center, LLC; Answer Financial,  
Inc.; AllState Insurance Company; Esurance Insurance Services, Inc.  
United States District Court Central District of California Southern Division  
Deposition Testimony

Motorola, Inc. v. InterDigital Technology Corporation  
Civil Action No. 93-488  
United States District Court for the District of Delaware  
Trial and Deposition Testimony



Nellcor Puritan Bennett, LLC v. CAS Medical Systems, Inc.  
Case No. 2:11-CV-15697  
United States District Court for the Eastern District of Michigan Southern  
Division  
Deposition Testimony

Netlist, Inc. v. Diablo Technologies, Inc.  
Civil Action No. 4:13-CV-05962-YGR  
United States District Court for the Central District of California Oakland  
Division  
Trial Testimony

Nomadix, Inc. v. Hewlett-Packard Company, et al.  
Civil Action No. CV09-08441 DDP(VBKx)  
United States District Court for the Central District of California Western  
Division  
Deposition Testimony

Nomix Corporation v. Quikrete Companies, Inc.  
Civil Action No. H88-463-AHN  
Trial and Deposition Testimony

Orthofix, Inc., et al v. EBI Medical Systems, Inc., et al.  
Civil Action No. 95-6035 (SMO)  
United States District Court for the District of New Jersey  
Trial and Deposition Testimony

Pharmacia & Upjohn Company, LLC v. Sicor Inc. and Sicor Pharmaceuticals,  
Inc.  
Civil Action No. 04-833 (KAJ)  
United States District Court for the District of Delaware  
Deposition Testimony

Picker International, Inc. v. Mayo Foundation, et al.  
Case No. 95-CV-2028  
United States District Court for the Northern District of Ohio, Eastern Division  
Trial and Deposition Testimony

Penda Corporation v. United States of America and Cadillac Products, Inc.  
Case No. 473-89-C  
United States Court of Federal Claims  
Trial and Deposition Testimony

Peter Daou and James Boyce v. Arianna Huffington, Kenneth Lerer and  
TheHuffingtonPost.com, Inc.  
Index No. 651997/2010  
Supreme Court of the State of New York, County of New York  
Deposition Testimony

Power Integrations, Inc. v. Fairchild Semiconductor International, Inc., Fairchild  
Semiconductor Corporation and System General Corporation



Case No. 3:09-cv-05235-MMC  
United States District Court for the Northern District of California  
Trial and Deposition Testimony

Powertech Technology, Inc. v. Tessera, Inc.  
Case No. CV10-00945EMC  
United States District Court for the Northern District of California  
Deposition Testimony

Praxair, Inc. and Praxair Technology, Inc. v. ATMI, Inc. and Advanced  
Technology Materials, Inc.  
Civil Action No. 03-1158-SLR  
United States District Court District of Delaware  
Deposition Testimony

Prism Technologies, LLC v. AT&T Mobility, LLC  
Civil Action No. 8:12-cv-122-LES-TDT  
United States District Court of Nebraska  
Deposition Testimony

Prism Technologies, LLC v. T-Mobile USA, Inc.  
Civil Action No. 8:12-cv-00124  
United States District Court of Nebraska  
Trial and Deposition Testimony

Prism Technologies, LLC v. Sprint Spectrum L.P. d/b/a/ Sprint PCS  
Civil Action No. 8:12-cv-123-LES-TDT  
United States District Court of Nebraska  
Trial and Deposition Testimony

The Procter & Gamble Company v. Paragon Trade Brands, Inc.  
Civil Action No. 94-16-LON  
United States District Court for the District of Delaware  
Trial and Deposition Testimony

QR Spex, Inc. and Thomas G. Swab v. Motorola, Inc. and Frog Design, Inc.  
Civil Action No 03-6284 JFW (FMOx)  
United States District Court for the Central District of California  
Deposition Testimony

Qualcomm, Inc. v. InterDigital Communications Corporation  
Case No. 93-1091G (LSP)  
Deposition Testimony

Quickie, LLC v. Medtronic, Inc.  
Civil Action No. 02 CV 1157 (GEL)  
United States District Court for the Southern District of New York  
Deposition Testimony

Radware, LTD, and Radware, Inc. v. F5 Networks, Inc.  
Civil Action No. 5:13-cv-02024 RMW



United States District Court for the Southern District of California San Jose  
Division  
Deposition Testimony

Remcor v. Scotsman/Booth  
Civil Action No. 93 C 1822  
United States District Court for the Northern District of Illinois, Eastern  
Division  
Deposition Testimony

Remcor v. Servend  
Civil Action No. 93 C 1823  
United States District Court for the Northern District of Illinois, Eastern  
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Deposition Testimony

Rensselaer Polytechnic Institute and Dynamic Advances, LLC v. Apple Inc.  
Case No 1:13-cv-00633 (DNH/DEP)  
United States District Court for the Northern District of New York  
Deposition Testimony

Research Corporation Technologies, Inc. v. Hewlett-Packard Company  
Civil Action No. CIV 95-490-TUC-JMR  
United States District Court for the District of Arizona  
Deposition Testimony

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and James McKelvey, Jr.  
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United States District Court for the Eastern District of Missouri  
Deposition Testimony

Rommy Hunt Revson v. The Limited, Inc. et al.  
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Deposition Testimony

Ronald A. Katz Technology Licensing, LP v. Ameren Corporation; Union  
Electric Company; Central Illinois Public Service Company; Cilcorp, Inc.;  
Central Illinois Light Company  
Case No. 07-4955 RGK (FFMx)  
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Deposition Testimony

Ronald A. Katz Technology Licensing, LP v. AOL, LLC, CompuServe  
Interactive Services and Netscape Communications Corporation  
CV 07-2134 RGK (FFMx)  
United States District Court for the Central District of California  
Deposition Testimony

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Case No. 2:07-ML-01816 / 02314 RGK-FFM



United States District Court for the Central District of California  
Deposition Testimony

Ronald A. Katz Technology Licensing, LP v. Charter Communications, Inc.;  
Charter Communications Holding Company, LLC; Charter Communications  
Operating, LLC; and Charter Communications Entertainment I, LLC  
CV 07-2134 RGK (FFMx)  
United States District Court for the Central District of California  
Deposition Testimony

Ronald A. Katz Technology Licensing, LP v. CIGNA Corporation, CIGNA  
Health Corporation, CIGNA HealthCare of Delaware, Inc., Tel-Drug of  
Pennsylvania, LLC and Tel-Drug, Inc.  
CV 07-2192 RGK (FFMx)  
United States District Court for the Central District of California  
Deposition Testimony

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Radio, Inc., et al.  
NO. 2:07-ML-01816-C RGK (FFMx)  
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Deposition Testimony

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Express (USA), Inc., and Sky Courier, Inc.  
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United States District Court for the Central District of California  
Deposition Testimony

Ronald A. Katz Technology Licensing, LP v. Fifth Third Bankcorp, Fifth Third  
Bank, Fifth Third Bank (Central Ohio)  
Case No. 07-4960 RGK (FFMx)  
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Deposition Testimony

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Warner NY Cable LLC and Time Warner Entertainment Company, L.P.  
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Deposition Testimony

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Deposition Testimony

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United States District Court for the Eastern District of Virginia  
Deposition Testimony



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and KCI Therapeutic Services, Inc.  
Case No. SA-96-CA-603-OG  
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Division  
Trial Testimony

Saxon Innovations, LLC v. Nokia Corp, et al. (including Samsung Electronics,  
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Civil Action No. 6:07-cv-490-LED-JDL  
United States District Court for the Eastern District of Texas Tyler Division  
Deposition Testimony

Semiconductor Energy Laboratory Co., Ltd. v. Samsung Electronics Co., Ltd.,  
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United States District Court for the Western District of Wisconsin  
Deposition Testimony

Silicon Image, Inc. v. Analogix Semiconductor, Inc.  
Case No. C 07-00635 JCS  
United States District Court for the Northern District of California, San  
Francisco Division  
Deposition Testimony

Site Microsurgical Systems v. The Cooper Companies  
Civil Action S92-766  
Deposition Testimony

SmartPhone Technologies, LLC v. Research In Motion Corp. et. al (on behalf  
LG Electronics, Inc. and LG Electronics USA, Inc.)  
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Deposition Testimony

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Photo Film U.S.A., Inc., Fujifilm America, Inc., et al.  
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United States District Court for the District of Delaware  
Trial and Deposition Testimony

STMicroelectronics, Inc. v. SanDisk Corp.  
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Deposition Testimony

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C.A. No. 4:05CV45  
United States District Court of Texas Sherman Division  
Deposition Testimony



Takata Corp. v. Allied Signal, Inc. and Breed Technologies, Inc.  
Civil Action CV-95-1750  
Deposition Testimony

Technol Medical Products, Inc., et al v. Robert Busse & Co., Inc.  
Civil Action No. 3:94-CV-2284-X  
Deposition Testimony

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Alnylam Pharmaceuticals, Inc. and AlCana Technologies, Inc.  
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Deposition Testimony

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Case No. 4:05-cv-04063-CW  
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Deposition Testimony

Tessera, Inc. v. UTAC (Taiwan) Corporation  
Case No.: 5:10-cv-04435-EJD  
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Division  
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Cadet LLC  
Civil Action No 10-cv-007-JNE-TNL  
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Deposition Testimony

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CaptionCall, LLC  
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Trial and Deposition Testimony

Unwired Planet, LLC v. Apple, Inc.  
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Francisco Division  
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Case No. 3:12-cv-00865-SI  
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Volterra Semiconductor Corporation v. Primarion, Inc., Infineon Technologies AG and Infineon Technologies North America Corporation

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Deposition Testimony

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Civil Action No. 97-1628-A  
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Deposition Testimony

Wang Laboratories, Inc. v. FileNet Corporation

Civil Action No. 94-12141-RCL  
Deposition Testimony

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Oracle America, Inc. v. Google, Inc.

**DOCUMENTS CONSIDERED**

Exhibit 2

I was provided with access to a Relativity database of materials produced in this case. I reviewed the documents provided therein through keyword searches. The following list contains many of the documents I reviewed in that database, as well as other documents provided to me by counsel, though it should not be considered comprehensive.

**Documents Produced by Google**

GOOG-00273854 - GOOG-00273874	GOOGLE-22-00072075	GOOGLE-26-00023560 - GOOGLE-26-00023578	GOOGLE-37-00023782 - GOOGLE-37-00023785
GOOG-00276658 - GOOG-00276675	GOOGLE-22-00072076 - GOOGLE-22-00072145	GOOGLE-26-00023579 - GOOGLE-26-00023597	GOOGLE-38-00010714 - GOOGLE-38-00010720
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*Oracle America, Inc. v. Google, Inc.*

**DOCUMENTS CONSIDERED**

Exhibit 2

I was provided with access to a Relativity database of materials produced in this case. I reviewed the documents provided therein through keyword searches. The following list contains many of the documents I reviewed in that database, as well as other documents provided to me by counsel, though it should not be considered comprehensive.

**Documents Produced by Oracle**

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OAGOOGL00000021991	OAGOOGL0000003717
OAGOOGL00000034595	OAGOOGL0000003718
OAGOOGL00000034596	OAGOOGL0000003719
OAGOOGL00000034597	OAGOOGL0000003720
OAGOOGL00000034598	OAGOOGL0000003721
OAGOOGL00000034599	OAGOOGL0000004051
OAGOOGL00000034600	OAGOOGL0000166381 - OAGOOGL0000166617
OAGOOGL00000034601	OAGOOGL0000166618
OAGOOGL00000034602	OAGOOGL0000166619
OAGOOGL00000115272 - OAGOOGL00000115290	OAGOOGL0000166620
OAGOOGL00000191668	OAGOOGL0000166621
OAGOOGL00000207699 - OAGOOGL00000207700	OAGOOGL0000166622 - OAGOOGL0000166720
OAGOOGL00000609523 - OAGOOGL00000609529	OAGOOGL0000166739
OAGOOGL00000835968	OAGOOGL0000166740 - OAGOOGL0000166756
OAGOOGL00000835969 - OAGOOGL00000835978	OAGOOGL0000166757
OAGOOGL00001049230 - OAGOOGL00001049234	OAGOOGL0000166758 - OAGOOGL0000166772
OAGOOGL00001342929 - OAGOOGL00001342934	OAGOOGL0000166773
OAGOOGL00003997531 - OAGOOGL00003997532	OAGOOGL0000166774 - OAGOOGL0000166785
OAGOOGL00004260166 - OAGOOGL00004260187	OAGOOGL0000166786 - OAGOOGL0000166797
OAGOOGL00004381807	OAGOOGL0000166798
	OAGOOGL0000166799 - OAGOOGL0000166819
OAGOOGL00007356222 - OAGOOGL00007356223	OAGOOGL0000166818
OAGOOGL00010533477 - OAGOOGL00010533492	OAGOOGL0000166819
OAGOOGL00011726508 - OAGOOGL00011726539	OAGOOGL0000166820 - OAGOOGL0000166836
OAGOOGL00012956691 - OAGOOGL00012956693	OAGOOGL0000166837
OAGOOGL00013561757 - OAGOOGL00013561786	OAGOOGL0000166838 - OAGOOGL0000166852
OAGOOGL00014551785 - OAGOOGL00014551796	OAGOOGL0000166853
OAGOOGL00017187388	OAGOOGL0000166854 - OAGOOGL0000166865
OAGOOGL00100003473 - OAGOOGL00100003508	OAGOOGL0000166866 - OAGOOGL0000166877
OAGOOGL00100022356 - OAGOOGL00100022360	OAGOOGL0000166878
OAGOOGL00100022362 - OAGOOGL00100022371	OAGOOGL0000166879 - OAGOOGL0000166897
OAGOOGL00100022372 - OAGOOGL00100022375	OAGOOGL0000166898
OAGOOGL00100022381	OAGOOGL0000179296 - OAGOOGL0000179312
OAGOOGL00100022394 - OAGOOGL00100022398	OAGOOGL0000179313
OAGOOGL00100038465 - OAGOOGL00100038476	OAGOOGL0000179314 - OAGOOGL0000179331
OAGOOGL00100046448 - OAGOOGL00100046453	OAGOOGL0000179332
OAGOOGL00100049911 - OAGOOGL00100049914	OAGOOGL0000179333 - OAGOOGL0000179351
OAGOOGL00100050310 - OAGOOGL00100050321	OAGOOGL0000179352
OAGOOGL00100072596 - OAGOOGL00100072598	OAGOOGL0000180989
OAGOOGL00100405426 - OAGOOGL00100405428	OAGOOGL0000180990
OAGOOGL00100412584 - OAGOOGL00100412600	OAGOOGL0000462635 - OAGOOGL0000462638
OAGOOGL00100628653 - OAGOOGL00100628674	OAGOOGL0000000021 - OAGOOGL0000000024
OAGOOGL00102011116 - OAGOOGL00102011126	OAGOOGL0000000496 - OAGOOGL0000000499
OAGOOGL00102289092 - OAGOOGL00102289121	OAGOOGL0000000500 - OAGOOGL0000000503
OAGOOGL00102341461 - OAGOOGL00102341469	OAGOOGL0000000504 - OAGOOGL0000000511
OAGOOGL00102403193 - OAGOOGL00102403217	OAGOOGL0000000512 - OAGOOGL0000000517
OAGOOGL0000003709	OAGOOGL0000000518 - OAGOOGL0000000523
OAGOOGL0000003710	
OAGOOGL0000003713	
OAGOOGL0000003715	
OAGOOGL0000003716	

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**Depositions**

Deposition of Jonathan Gold, January 29, 2016 with Exhibits  
Deposition of Henrik Stahl, January 14, 2016, with Exhibits  
Deposition of Felix Lin, December 14, 2015, with Exhibits  
Deposition of Felix Lin, December 18, 2015, with Exhibits

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**Expert Reports**

Expert Report of Chris F. Kemerer, Ph.D., January 8, 2016  
Expert Report of Professor Douglas C. Schmidt, Ph.D., January 8, 2016  
Expert Report of Robert Zeidman, January 8, 2016  
Opening Expert Report of Dr. Owen Astrachan on Technical Issues Relating to Fair Use, January 8, 2016  
Opening Expert Report of Roderic G. Cattell, Ph.D., January 8, 2016  
Opening Expert Report of Andrew Hall, January 8, 2016  
Rebuttal Expert Report of Dr. Owen Astrachan, February 8, 2016  
Rebuttal Expert Report of Andrew Hall, February 8, 2016  
Expert Report of Dr. Gregory K. Leonard, February 8, 2016  
Expert Report of Dr. Itamar Simonson, February 8, 2016  
Expert Report of Professor Adam Jaffe, Ph.D., February 8, 2016  
Expert Report of Chris F. Kemerer, Ph.D. Regarding Fair Use and Rebuttal to Google's Opening Expert Reports, February 8, 2016  
Rebuttal Expert Report of Gwyn Firth Murray, February 8, 2016  
Expert Report of Professor Douglas C. Schmidt, Ph.D. Regarding Fair Use and Rebuttal to Google's Opening Expert Reports, February 8, 2016  
Reply Expert Report of Chris F. Kemerer, Ph.D., February 29, 2016  
Reply Expert Report of Professor Adam Jaffe, Ph.D., February 29, 2016  
Reply Expert Report of Professor Douglas C. Schmidt, Ph.D., February 29, 2016

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0002	0046.14	0047.2	0063	0098	0135	0174	0214
0004	0046.15	0047.20	0064	0099	0136	0175	0216
0005	0046.16	0047.21	0065	0100	0137	0176	0218
0006	0046.17	0047.22	0066	0101	0138	0177	0219
0009	0046.18	0047.23	0067	0102	0139	0178	0220
0011	0046.19	0047.24	0068	0103	0140	0179	0221
0014	0046.2	0047.25	0069	0105	0141	0180	0222
0015	0046.20	0047.26	0070	0106	0142	0181	0223
0016	0046.21	0047.27	0071	0107	0143	0182	0224
0019	0046.22	0047.28	0072	0108	0144	0183	0225
0020	0046.23	0047.29	0073	0109	0145	0184	0226
0025	0046.24	0047.3	0074	0110	0146	0185	0227
0030	0046.25	0047.30	0075	0111	0147	0186	0228
0032	0046.26	0047.4	0076	0112	0148	0187	0229
0034	0046.27	0047.5	0077	0113	0149	0188	0231
0035	0046.28	0047.6	0078	0114	0150	0189	0232
0036	0046.29	0047.7	0079	0115	0151	0190	0233
0037	0046.3	0047.8	0080	0116	0152	0191	0235
0038	0046.4	0047.9	0081	0117	0153	0192	0236
0039	0046.5	0047	0082	0118	0155	0193	0237
0040	0046.6	0048	0083	0119	0156	0194	0238
0041	0046.7	0049	0084	0120	0159	0195	0239
0042	0046.8	0050	0085	0121	0160	0197	0240
0043.1	0046.9	0051	0086	0122	0161	0198	0241
0043	0046	0052	0087	0123	0162	0199	0242
0044	0047.1	0053	0088	0124	0163	0200	0243
0045.1	0047.10	0054	0089	0126	0164	0202	0244
0045.2	0047.11	0055	0090	0127	0166	0203	0245
0045.3	0047.12	0056	0091	0128	0167	0204	0246
0045	0047.13	0057	0092	0129	0168	0205	0247
0046.1	0047.15	0058	0093	0130	0169	0208	0248
0046.10	0047.16	0059	0094	0131	0170	0209	0249
0046.11	0047.17	0060	0095	0132	0171	0211	0250
0046.12	0047.18	0061	0096	0133	0172	0212	0251
0046.13	0047.19	0062	0097	0134	0173	0213	0252

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0253	0289	0325	0362	0400	0437	0472	0507
0254	0290	0327	0363	0401	0438	0473	0508
0255	0291	0328	0364	0402	0439	0474	0509
0256	0292	0329	0365	0403	0440	0475	0510
0257	0293	0330	0366	0404	0441	0476	0511
0258	0294	0331	0367	0406	0442	0477	0512
0259	0295	0332	0368	0407	0443	0478	0513
0260	0296	0333	0369	0408	0444	0479	0514
0261	0298	0334	0371	0409	0445	0480	0515
0262	0299	0335	0372	0410	0446	0481	0516
0263	0300	0336	0373	0411	0447	0482	0517
0264	0301	0337	0374	0412	0448	0483	0518
0265	0302	0338	0375	0413	0449	0484	0519
0266	0303	0339	0376	0414	0450	0485	0520
0267	0304	0340	0377	0415	0451	0486	0521
0268	0305	0342	0378	0416	0452	0487	0522
0270	0306	0343	0379	0417	0453	0488	0523
0271	0307	0344	0380	0418	0454	0489	0524
0272	0308	0345	0381	0419	0455	0490	0525
0273	0309	0346	0383	0420	0456	0491	0526
0274	0310	0347	0384	0421	0457	0492	0527
0275	0311	0348	0385	0422	0458	0493	0528
0276	0312	0349	0386	0423	0459	0494	0529
0277	0313	0350	0388	0424	0460	0495	0532
0278	0314	0351	0389	0425	0461	0496	0533
0279	0315	0352	0390	0426	0462	0497	0534
0280	0316	0353	0391	0427	0463	0498	0535
0281	0317	0354	0392	0428	0464	0499	0536
0282	0318	0355	0393	0429	0465	0500	0537
0283	0319	0356	0394	0430	0466	0501	0538
0284	0320	0357	0395	0432	0467	0502	0539
0285	0321	0358	0396	0433	0468	0503	0540
0286	0322	0359	0397	0434	0469	0504	0541
0287	0323	0360	0398	0435	0470	0505	0542
0288	0324	0361	0399	0436	0471	0506	0543

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0544	0580	0613	0638	0673	0708	0743	0778
0545	0581	0614	0639	0674	0709	0744	0779
0546	0582	0615	0640	0675	0710	0745	0780
0547	0583	0616	0641	0676	0711	0746	0781
0548	0584	0617	0642	0677	0712	0747	0782
0549	0585	0620	0643	0678	0713	0748	0783
0550	0586	0621	0644	0679	0714	0749	0784
0551	0587	0622	0645	0680	0715	0750	0785
0552	0588	0623.1	0646	0681	0716	0751	0786
0553	0589	0623.10	0647	0682	0717	0752	0787
0554	0590	0623.101	0648	0683	0718	0753	0788
0555	0591	0623.102	0649	0684	0719	0754	0789
0556	0592	0623.2	0650	0685	0720	0755	0790
0557	0593	0623.3	0651	0686	0721	0756	0791
0558	0594	0623.4	0652	0687	0722	0757	0792
0559	0595	0623.5	0653	0688	0723	0758	0793
0560	0596	0623.6	0654	0689	0724	0759	0794
0561	0597	0623.7	0655	0690	0725	0760	0795
0562	0598	0623.8	0656	0691	0726	0761	0796
0563	0599	0623.9	0657	0692	0727	0762	0797
0564	0600	0623	0658	0693	0728	0763	0798
0566	0601	0624	0659	0694	0729	0764	0799
0567	0602	0625	0660	0695	0730	0765	0800
0568	0603	0626	0661	0696	0731	0766	0801
0569	0604	0627	0662	0697	0732	0767	0802
0570	0605	0628	0663	0698	0733	0768	0803
0571	0606	0629	0664	0699	0734	0769	0804
0572	0607	0630	0665	0700	0735	0770	0805
0573	0608	0631	0666	0701	0736	0771	0806
0574	0609	0632	0667	0702	0737	0772	0807
0575	0610.2	0633	0668	0703	0738	0773	0808
0576	0610	0634	0669	0704	0739	0774	0809
0577	0611.1	0635	0670	0705	0740	0775	0810
0578	0611	0636	0671	0706	0741	0776	0811
0579	0612	0637	0672	0707	0742	0777	0812

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0813	0848	0883	0910	0946	0977	1012	1053
0814	0849	0884	0911	0947	0978	1013	1054
0815	0850	0885	0912	0948	0979	1014	1055
0816	0851	0886	0913	0949	0980	1015	1057
0817	0852	0887	0914	0950	0981	1016	1058
0818	0853	0888	0915	0951	0982	1017	1059
0819	0854	0889	0916	0952	0983	1018	1060
0820	0855	0890	0918	0953	0984	1019	1062
0821	0856	0891	0919	0954	0985	1020	1063
0822	0857	0892	0920	0955	0986	1021	1064
0823	0858	0893	0921	0956	0987	1022	1065
0824	0859	0894	0922	0957	0988	1023	1066
0825	0860	0895	0923	0958.1	0989	1024	1067
0826	0861	0896.1	0924	0958.2	0990	1025	1068
0827	0862	0896.2	0925	0958.3	0991	1027	1069
0828	0863	0896.3	0926	0958.4	0992	1028	1070
0829	0864	0896.4	0927	0958	0993	1030	1071
0830	0865	0896.5	0928	0959	0994	1031	1072
0831	0866	0896.6	0929	0960	0995	1032	1073
0832	0867	0896.7	0930	0961	0996	1033	1075
0833	0868	0896.8	0931	0962	0997	1034	1076
0834	0869	0896	0932	0963	0998	1035	1077
0835	0870	0897	0933	0964	0999	1036	1078
0836	0871	0898	0934	0965	1000	1037	1079
0837	0872	0899	0935	0966	1001	1038	1081
0838	0873	0900	0936	0967	1002	1039	1090
0839	0874	0901	0937	0968	1003	1040	1091
0840	0875	0902	0938	0969	1004	1041	1092
0841	0876	0903	0939	0970	1005	1042	1093
0842	0877	0904	0940	0971	1006	1043	1094
0843	0878	0905	0941	0972	1007	1044	1095
0844	0879	0906	0942	0973	1008	1046	1096
0845	0880	0907	0943	0974	1009	1048	1097
0846	0881	0908	0944	0975	1010	1049	1098
0847	0882	0909	0945	0976	1011	1052	1099

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1100	1206	2023	2058	2093	2128	2163	2199
1101	1208.1	2024	2059	2094	2129	2164	2200
1102	1210	2025	2060	2095	2130	2165	2201
1103	1211	2026	2061	2096	2131	2166	2203
1104	1212	2027	2062	2097	2132	2167	2204
1105	1213	2028	2063	2098	2133	2168	2205
1106	1214.1	2029	2064	2099	2134	2169	2206
1107	1214	2030	2065	2100	2135	2170	2207
1108	1215	2031	2066	2101	2136	2171	2208
1109	1216	2032	2067	2102	2137	2172	2209
1110	1217	2033	2068	2103	2138	2173	2210
1111	1218	2034	2069	2104	2139	2174	2211
1112	1219	2035	2070	2105	2140	2175	2212
1113	2000	2036	2071	2106	2141	2176	2213
1114	2001	2037	2072	2107	2142	2177	2214
1115	2002	2038	2073	2108	2143	2178	2215
1116	2003	2039	2074	2109	2144	2179	2216
1117	2004	2040	2075	2110	2145	2180	2217
1118	2005	2041	2076	2111	2146	2181	2218
1119	2006	2042	2077	2112	2147	2182	2219
1120	2007	2043	2078	2113	2148	2183	2220
1125	2008	2044	2079	2114	2149	2184	2221
1126	2010	2045	2080	2115	2150	2185	2222
1127	2011	2046	2081	2116	2151	2186	2223
1128	2012	2047	2082	2117	2152	2187	2224
1129	2013	2048	2083	2118	2153	2188	2225
1130	2014	2049	2084	2119	2154	2189	2226
1131	2015	2050	2085	2120	2155	2190	2227
1132	2016	2051	2086	2121	2156	2191	2228
1133	2017	2052	2087	2122	2157	2192	2229
1201	2018	2053	2088	2123	2158	2193	2230
1202	2019	2054	2089	2124	2159	2194	2231
1203.1	2020	2055	2090	2125	2160	2196	2232
1204	2021	2056	2091	2126	2161	2197	2233
1205	2022	2057	2092	2127	2162	2198	2234

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2235	2270	2305	2340	2377	2412	2447	2482
2236	2271	2306	2341	2378	2413	2448	2483
2237	2272	2307	2342	2379	2414	2449	2484
2238	2273	2308	2343	2380	2415	2450	2485
2239	2274	2309	2344	2381	2416	2451	2486
2240	2275	2310	2345	2382	2417	2452	2487
2241	2276	2311	2346	2383	2418	2453	2488
2242	2277	2312	2348	2384	2419	2454	2489
2243	2278	2313	2349	2385	2420	2455	2490
2244	2279	2314	2350	2386	2421	2456	2491
2245	2280	2315	2351	2387	2422	2457	2492
2246	2281	2316	2352	2388	2423	2458	2493
2247	2282	2317	2353	2389	2424	2459	2494
2248	2283	2318	2354	2390	2425	2460	2495
2249	2284	2319	2355	2391	2426	2461	2496
2250	2285	2320	2356	2392	2427	2462	2497
2251	2286	2321	2357	2393	2428	2463	2498
2252	2287	2322	2358	2394	2429	2464	2499
2253	2288	2323	2359	2395	2430	2465	2500
2254	2289	2324	2360	2396	2431	2466	2501
2255	2290	2325	2361	2397	2432	2467	2502
2256	2291	2326	2362	2398	2433	2468	2503
2257	2292	2327	2363	2399	2434	2469	2504
2258	2293	2328	2364	2400	2435	2470	2505
2259	2294	2329	2365	2401	2436	2471	2506
2260	2295	2330	2366	2402	2437	2472	2507
2261	2296	2331	2367	2403	2438	2473	2508
2262	2297	2332	2368	2404	2439	2474	2509
2263	2298	2333	2369	2405	2440	2475	2510
2264	2299	2334	2370	2406	2441	2476	2511
2265	2300	2335	2372	2407	2442	2477	2512
2266	2301	2336	2373	2408	2443	2478	2513
2267	2302	2337	2374	2409	2444	2479	2514
2268	2303	2338	2375	2410	2445	2480	2515
2269	2304	2339	2376	2411	2446	2481	2516

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2517	2552	2587	2622	2657	2694	2724	2759
2518	2553	2588	2623	2658	2695	2725	2760
2519	2554	2589	2624	2659	2696	2726	2761
2520	2555	2590	2625	2660	2697	2727	2762
2521	2556	2591	2626	2661	2698	2728	2763
2522	2557	2592	2627	2662	2699	2729	2764
2523	2558	2593	2628	2663	2700	2730	2766
2524	2559	2594	2629	2664	2701	2731	2767
2525	2560	2595	2630	2665	2702	2732	2768
2526	2561	2596	2631	2666	2703	2733	2769
2527	2562	2597	2632	2667	2704	2734	2770
2528	2563	2598	2633	2668	2705	2735	2771
2529	2564	2599	2634	2669	2706	2736	2772
2530	2565	2600	2635	2670	2708	2737	2773
2531	2566	2601	2636	2671	2709	2738	2774
2532	2567	2602	2637	2672	2710	2739	2775
2533	2568	2603	2638	2673	2711	2740	2776
2534	2569	2604	2639	2674	2712	2741	2777
2535	2570	2605	2640	2675	2713	2742	2778
2536	2571	2606	2641	2676	2714	2743	2779
2537	2572	2607	2642	2677	2715	2744	2780
2538	2573	2608	2643	2678	2716	2745	2781
2539	2574	2609	2644	2679	2717	2746	2782
2540	2575	2610	2645	2680	2718.1	2747	2783
2541	2576	2611	2646	2681	2718.2	2748	2784
2542	2577	2612	2647	2682	2718.3	2749	2785
2543	2578	2613	2648	2683	2718.4	2750	2786
2544	2579	2614	2649	2684	2718.5	2751	2787
2545	2580	2615	2650	2685	2718.6	2752	2788
2546	2581	2616	2651	2688	2718	2753	2789
2547	2582	2617	2652	2689	2719	2754	2790
2548	2583	2618	2653	2690	2720	2755	2791
2549	2584	2619	2654	2691	2721	2756	2792
2550	2585	2620	2655	2692	2722	2757	2793
2551	2586	2621	2656	2693	2723	2758	2794

*Oracle America, Inc. v. Google, Inc.***DOCUMENTS CONSIDERED**

Exhibit 2

**Trial Exhibits**

2795	2829	2864	2898	2932	2966	3001	3037
2796	2830	2865	2899	2933	2967	3002	3038
2797	2831	2866	2900	2934	2968	3003	3039
2798	2832	2867	2901	2935	2969	3004	3040
2799	2833	2868	2902	2936	2970	3005	3041
2800	2834	2869	2903	2937	2971	3006	3042
2801	2835	2870	2904	2938	2972	3007	3043
2802	2836	2871	2905	2939.1	2973	3008	3044
2803	2837	2872	2906	2939	2974	3009	3045
2804.1	2838	2873	2907	2940	2975	3010	3046
2804	2839	2874	2908	2941	2976	3011	3047
2805	2840	2875	2909	2942	2977	3012	3048
2806	2841	2876	2910	2943	2978	3013	3049
2807	2842	2877	2911	2944	2979	3014	3050
2808	2843	2878	2912	2945	2980	3015	3051
2809	2844	2879.01	2913	2946	2981	3016	3052
2810	2845	2879	2914	2947	2982	3017	3053
2811	2846	2880	2915	2948	2983	3018	3054
2812	2847	2881	2916	2949	2984	3019	3055
2813	2848	2882	2917	2950	2985	3020	3056
2814	2849	2883	2918	2951	2986	3021	3057
2815	2850	2884	2919	2952	2987	3022	3058
2816	2851	2885	2920	2953	2988	3023	3059
2817	2852	2886	2921	2954	2989	3024	3060
2818	2853	2887	2922	2955	2990	3025	3061
2819	2854	2888	2923	2956	2991	3026	3062
2820	2855	2889	2924	2957	2992	3027	3063
2821	2856	2890	2925.1	2958	2993	3028	3064
2822	2857	2891	2925	2959	2994	3029	3065
2823	2858	2892	2926	2960	2995	3031	3066
2824	2859	2893	2927	2961	2996	3032	3067
2825	2860	2894	2928	2962	2997	3033	3068
2826	2861	2895	2929	2963	2998	3034	3069
2827	2862	2896	2930	2964	2999	3035	3070
2828	2863	2897	2931	2965	3000	3036	3071

*Oracle America, Inc. v. Google, Inc.***DOCUMENTS CONSIDERED**

Exhibit 2

**Trial Exhibits**

3072	3107	3142	3177	3212	3253	3288	3326
3073	3108	3143	3178	3213	3254	3289	3327
3074	3109	3144	3179	3214	3255	3290	3328
3075	3110	3145	3180	3216	3256	3291	3329
3076	3111	3146	3181	3217	3257	3292	3330
3077	3112	3147	3182	3218	3258	3293	3331
3078	3113	3148	3183	3219	3259	3294	3332
3079	3114	3149	3184	3220	3260	3295	3333
3080	3115	3150	3185	3221	3261	3296	3334
3081	3116	3151	3186	3222	3262	3297	3335
3082	3117	3152	3187	3223	3263	3298	3336
3083	3118	3153	3188	3224	3264	3299	3337
3084	3119	3154	3189	3225	3265	3300	3338
3085	3120	3155	3190	3226	3266	3301	3339
3086	3121	3156	3191	3227	3267	3302	3340
3087	3122	3157	3192	3228	3268	3303	3341
3088	3123	3158	3193	3229	3269	3304	3342
3089	3124	3159	3194	3230	3270	3305	3343
3090	3125	3160	3195	3231	3271	3306	3344
3091	3126	3161	3196	3232	3272	3307	3345
3092	3127	3162	3197	3233	3273	3308	3346
3093	3128	3163	3198	3234	3274	3309	3347
3094	3129	3164	3199	3235	3275	3310	3348
3095	3130	3165	3200	3236	3276	3311	3349
3096	3131	3166	3201	3238	3277	3312	3350
3097	3132	3167	3202	3239	3278	3313	3351
3098	3133	3168	3203	3240	3279	3314	3352
3099	3134	3169	3204	3241	3280	3315	3356
3100	3135	3170	3205	3242	3281	3316	3357
3101	3136	3171	3206	3247	3282	3320	3360
3102	3137	3172	3207	3248	3283	3321	3361
3103	3138	3173	3208	3249	3284	3322	3365
3104	3139	3174	3209	3250	3285	3323	3366
3105	3140	3175	3210	3251	3286	3324	3367
3106	3141	3176	3211	3252	3287	3325	3368

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Exhibit 2

**Trial Exhibits**


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3369	3405	3443	3481	3516	4007
3370	3406	3444	3482	3517	4008
3371	3407	3445	3483	3518	4009
3372	3408	3446	3484	3519	4010
3373	3409	3447	3485	3520	4011
3374	3410	3448	3486	3521	4012
3375	3411	3450	3487	3522	4013
3376	3412	3451	3488	3523	4014
3377	3413	3452	3489	3524	4015
3379	3416	3453	3490	3525	4016
3380	3418	3454	3491	3526	4017
3381	3419	3455	3492	3527	4018
3382	3420	3456	3493	3528	4019
3383	3421	3457	3494	3529	4020
3384	3422	3458	3495	3530	4021
3385	3423	3459	3496	3531	4022
3386	3424	3460	3497	3532	4023
3387	3425	3461	3498	3533	4024
3388	3426	3462	3499	3536	4025
3389	3427	3463	3500	3537	4026
3390	3428	3465	3501	3538	4027
3391	3429	3467	3502	3539	4028
3392	3430	3468	3503	3540	4029
3393	3431	3469	3504	3542	4030
3394	3432	3470	3505	3543	4031
3395	3433	3471	3506	3544	4032
3396	3434	3472	3507	3545	4033
3397	3435	3473	3508	3546	4034
3398	3436	3474	3509	4000	4035
3399	3437	3475	3510	4001	
3400	3438	3476	3511	4002	
3401	3439	3477	3512	4003	
3402	3440	3478	3513	4004	
3403	3441	3479	3514	4005	
3404	3442	3480	3515	4006	

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**DOCUMENTS CONSIDERED**

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**ECF Filings & Discovery**

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Charts produced pursuant to Order re: Motion to Compel [Dkt. 1404], January 20, 2016  
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Computer Associates Int'l, Inc. v. Altai, Inc., 982 F.2d 693 (2nd Cir. 1992)

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**Other Produced Documents**

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Email from Daniel Purcell to Annette Hurst, November 8, 2015.  
Memo on Exhibits 2c, 2g, 2h, 3b and Footnote 277, and 3d.3, February 23, 2016

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Exhibit 2

**Public**

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**Exhibit 3****Oracle Timeline of Selected Events**

- Mid-nineties** Sun develops the Java platform for computer programming and releases it. At that time, the API included seven packages of pre-written programs.<sup>1</sup>
- 1996** At the first-ever JavaOne developer conference, more than 6,000 attendees gather to learn more about Java technology. According to Sun, “[w]ith a broad range of Java-related product announcements from Sun and other companies and an exhibit hall filled with more than 160 businesses displaying Java products and services, it appears that a whole new industry is growing around a language launched just a year earlier.”<sup>2</sup>
- 1997** “With approximately 400,000 developers working in Java, it is now the #2 programming language in the world. More than 10,000 developers flock to the second annual JavaOne developer conference, where Sun announces improved security and compatibility for Java and a range of licensees who plan to take Java beyond the desktop in futuristic devices such as smartcards.”<sup>3</sup>
- 1999** “Sun announces a redefined architecture for the Java platform that makes it simpler for software developers, service providers, and device manufacturers to target specific markets. According to Sun, “[w]ith the introduction of Java 2 Platform, Standard Edition (J2SE) for desktop and workstation devices; Java 2 Platform, Enterprise Edition (J2EE) for heavy-duty server systems; and Java 2 Platform, Micro Edition (J2ME) for consumer devices, it’s now easier to capitalize on the Java platform for a growing range of opportunities.”<sup>4</sup>
- 2004** According to Sun, “[a]t the JavaOne developer conference, the big debate is whether Java should be open sourced. Currently, Sun requires that projects officially based on Java be certified as compatible with the Java specification; amendments to Java must go through Java Community Process (JCP) procedures.”
- “Open source advocates seek a freer path for Java. During a panel discussion at JavaOne, representatives from IBM and the Apache Software Foundation endorse an open source model for Java, while Java creator and Sun Fellow James Gosling, along with Sun Vice President and Fellow Rob Gingell and Red Monk Analyst James Governor oppose the move. Gosling warns that allowing multiple, open source implementations of Java technologies could yield the incompatibilities that happened with Unix and is happening again with Linux distributions.”<sup>5</sup>

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<sup>1</sup> Java Timeline, 1995 – 2015, available at <http://oracle.com.edgesuite.net/timeline/java>; Trial Testimony of Mark Reinhold, Trial Transcript Vol. 3, April 18, 2012, p. 631.

<sup>2</sup> Java Timeline, 1995 – 2015, available at <http://oracle.com.edgesuite.net/timeline/java>.

<sup>3</sup> Java Timeline, 1995 – 2015, available at <http://oracle.com.edgesuite.net/timeline/java>.

<sup>4</sup> Java Timeline, 1995 – 2015, available at <http://oracle.com.edgesuite.net/timeline/java>.

<sup>5</sup> Java Timeline, 1995 – 2015, available at <http://oracle.com.edgesuite.net/timeline/java>.

- 2005** Java celebrates its tenth anniversary with huge celebrations at the JavaOne developer conference and at Sun headquarters. Sun estimates Java now drives more than \$100 billion of business annually. It counts more than 4.5 million Java developers, 2.5 billion Java-enabled devices, and 1 billion Java technology-enabled smart cards. Analyst firm Ovum estimates that 708 million Java-enabled handsets were circulating by June 2005.<sup>6</sup>
- Jul 11, 2005** Google acquires Android Inc.<sup>7</sup> as part of its mobile strategy. At the time, Android was a 22-month old start up based in Palo Alto, California. The acquisition “brings to Google a wealth of talent, including co-founder Andy Rubin, who previously started mobile-device maker Danger Inc.”<sup>8</sup>
- 2005-2006** Shortly after Google acquired Android, Inc.,<sup>9</sup> Sun and Google engage in a series of negotiations, which Sun referred to as “Project Armstrong.”<sup>10</sup>
- Sep 2005** - Sun sends Google draft agreements for standard Java ME licenses; Google indicates it is seeking an approach that would allow an open-source implementation.<sup>11</sup>
- Oct 11, 2005** – “In October 2005, following “discussions with Sun regarding Android’s Open Source VM strategy,” Google’s then Senior Vice President, Andy Rubin, remarked in an e-mail, “If Sun doesn’t want to work with us, we have two options: 1) Abandon our work and adopt MSFT CLR VM and C# language – or – 2) Do Java anyway and defend our decision, perhaps making enemies along the way.”<sup>12</sup>
- In addition, Andy Rubin writes to Larry Page that Alan Brenner of Sun was concerned that “by open sourcing our J2ME VM we will make licensing ‘enforceability’ impossible for Sun – and he will lose revenue.”<sup>13</sup>
- Jan 2006** – Andy Rubin tells Sergey Brin and Larry Page that, in connection with the Android deal, Sun was “prepared to walk away from a \$100M annual J2ME licensing business into an open source business model.”<sup>14</sup> In other words, Google knew that Sun actually expected to lose hundreds of millions of dollars per year in turning to an open-source business model by licensing Java for use in Android.<sup>15</sup>
- Jan 2006** – “Google internally discussed a possible co-development partnership deal under which Java technology would become an open-source part of the Android platform. The deal was projected to cost Google \$25-50 million, plus a negotiable share of revenue from

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<sup>6</sup> Java Timeline, 1995 – 2015, available at <http://oracle.com.edgesuite.net/timeline/java>.

<sup>7</sup> Trial Exhibit 1061 at 131; see also, GOOGLE-01-00056184 – 202 at 195; Deposition of Andrew Rubin, April 5, 2011, p. 20.

<sup>8</sup> “Google Buys Android for Its Mobile Arsenal”, Bloomberg Businessweek, August 16, 2005.

<sup>9</sup> Deposition of Andrew Rubin, April 5, 2011, pp. 12-13.

<sup>10</sup> Project Armstrong: Business Model, February 2006, OAGOOGL0100166874 – 899.

<sup>11</sup> Email exchange between Leo Cizek and Andy Rubin, September 19, 2005, OAGOOGL0100167795 - 798 at 797.

<sup>12</sup> GOOGLE-01-00019527-528 at 528; Deposition of Andrew Rubin, April 5, 2011, p. 20.

<sup>13</sup> Email between Andy Rubin and Larry Page, October 11, 2005, GOOGLE-01-00019527 – 528 at 527.

<sup>14</sup> Email from Andy Rubin to Sergey Brin, et al., January 13, 2006, GOOGLE-26-00007930.

<sup>15</sup> Email from Eric Chu to Alan Brenner, et al., November 21, 2005, OAGOOGL0100072597; Deposition of Eric Chu, April 28, 2011, p. 50.

“platform-enabled mobile ads.” The record however, contains no evidence that Google actually proposed this idea to Sun.”<sup>16</sup>

**Feb. 8, 2006** – The first formal financial proposal made by Sun to Google – proposes “\$20 Million per year for 3 year” and “10% of revenue generated by Google on handsets running ‘Open Source Java Linux Mobile Platform’ or derivatives with a cap of \$25 Million a year (when and if google monetizes – then this becomes effective. We added the cap as per Rich’s request . . .)”<sup>17</sup> Google rejected Sun’s offer.<sup>18</sup>

**Apr. 27, 2006** – Email from Jonathan Schwartz of Sun to Eric Schmidt of Google indicating that “[m]y team has alerted me that our negotiations to jointly create a Java-Linux mobile platform are at an impasse.”<sup>19</sup>

- Jan. 2007** Apple introduces the iPhone.
- Apr. 2007** Sun acquires SavaJe, a Java-based smartphone platform, for an estimated \$13.2M.<sup>20</sup>
- June 2007** The iPhone is first available for sale.
- Nov. 2007** Google publicly announces the Android platform.<sup>21</sup>
- 2008** Google and Sun engage in additional discussions regarding a license.<sup>22</sup>
- Nov. 2008** Google releases Android and launches the Android phone.<sup>23</sup>
- Mar. 2009** Larry Ellison sends Sun’s Board of Directors an offer to acquire certain pieces of Sun’s business.<sup>24</sup>
- Apr. 19 2009** Oracle and Sun enter into the 2010 Sun/Oracle Merger.<sup>25</sup>
- Jan. 2010** Oracle acquires Sun and renames it Oracle America, Inc.<sup>26</sup>
- May 2010** Google TV, Google’s first attempt to create a TV platform based on Android, is announced on several devices, such as Sony Internet TV and the Logitech Revue, a set-top box device.<sup>27</sup>

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<sup>16</sup> Order Granting In Part Motion to Strike Damages Report of Plaintiff Expert Iain Cockburn, July 22, 2011, p. 3.

<sup>17</sup> Email from Vineet Gupta to Andy Rubin, February 8, 2006, OAGOOGL0000357494.

<sup>18</sup> OAGOOGL0000358110 ..

<sup>19</sup> Email from Jonathan Schwartz to Eric Schmidt, et al., April 27, 2006, GOOGLE-66-00000274.

<sup>20</sup> OAGOOGL0000424812 – 813 at 812; OAGOOGL0002304236-243 at 237.

<sup>21</sup> Order Granting In Part Motion to Strike Damages Report of Plaintiff Expert Iain Cockburn, July 22, 2011, p. 3.

<sup>22</sup> Deposition of Andrew Rubin, April 5, 2011, p. 14.

<sup>23</sup> Deposition of Andrew Rubin, April 5, 2011, p. 14. (But see, T-Mobile Unveils the T-Mobile G1 – the First Phone Powered by Android, [http://www.t-mobile.com/company/PressReleases\\_Article.aspx?assetName=Prs\\_Prs\\_20080923](http://www.t-mobile.com/company/PressReleases_Article.aspx?assetName=Prs_Prs_20080923) which indicates October 2008).

<sup>24</sup> OAGOOGL0000140115-130.

<sup>25</sup> Sun 2009 Form 10-K, p. 3.

<sup>26</sup> <http://www.bloomberg.com/research/stocks/private/snapshot.asp?privcapId=34903>

<sup>27</sup> <https://googleblog.blogspot.com/2010/05/announcing-google-tv-tv-meets-web-web.html>;  
<http://www.engadget.com/2010/06/18/logitech-revue-gets-official-google-tv-companion-box-coming-thi/>;  
<http://www.sony.net/SonyInfo/News/Press/201005/10-0521BE/>.

- Aug 6, 2010** Rubin receives an internal (Google) email stating that the technical alternatives to using Java for Android “all suck” and stating “We conclude that we need to negotiate a license for Java under the terms we need.”<sup>28</sup>
- Aug 12, 2010** Oracle files its initial complaint in this action.<sup>29</sup>
- Oct. 28, 2010** According to the Supplemental Complaint, from this date “Google has continued to infringe Oracle’s copyrights in the Java platform. Since then, Google has released seven versions of Android:
- Gingerbread (released December 2010);
  - Honeycomb (released February 2011);
  - Ice Cream Sandwich (released October 2011);
  - Jelly Bean (released July 2012)
  - KitKat (released October 2013); and
  - Lollipop (released November 2014).<sup>30</sup>
  - Marshmallow (released October 5, 2015).<sup>31</sup>

“These six named Android releases comprise approximately 40 major and minor releases of Android. . . . As with the previous versions of Android, these six Android releases copy thousands of lines of source code from the Java platform, as well as the structure, sequence and organization (“SSO”) of that platform as reflected in the asserted 37 Java API packages.”<sup>32</sup>

According to the Supplemental Complaint:

- Android will still not work without these Java API packages.”<sup>33</sup>
- Since Oracle filed the Amended Complaint in October 2010, Android has become the most widely used mobile platform in the world.<sup>34</sup>
- There are over one billion active monthly Android users and more than 8,000 different devices running versions of Android.<sup>35</sup>
- Users have downloaded more than 50 billion applications from Google Play on a catalog of more than 1.5 million apps.<sup>36</sup>

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<sup>28</sup> Trial Exhibit 10 – GOOGLE-12-10000022; GOOGLE-12-00039565; Deposition of Tim Lindholm, September 7, 2011, p. 102.

<sup>29</sup> Complaint for Patent and Copyright Infringement, August 12, 2010.

<sup>30</sup> Plaintiff Oracle’s Supplemental Complaint, August 12, 2015, p. 1.

<sup>31</sup> <http://www.pocket-lint.com/news/134946-when-is-android-6-0-marshmallow-coming-to-my-phone>.

<sup>32</sup> Plaintiff Oracle’s Supplemental Complaint, August 12, 2015, p. 1.

<sup>33</sup> Plaintiff Oracle’s Supplemental Complaint, August 12, 2015, p. 1.

<sup>34</sup> Plaintiff Oracle’s Supplemental Complaint, August 12, 2015, p. 2.

<sup>35</sup> Plaintiff Oracle’s Supplemental Complaint, August 12, 2015, p. 3.

<sup>36</sup> Plaintiff Oracle’s Supplemental Complaint, August 12, 2015, p. 3.

- Android use is also up as measured by advertising. By some accounts, Android is now the top mobile advertising platform as measured by total advertising revenue and by traffic.<sup>37</sup>

- Oct 2010** Google TV devices launch.<sup>38</sup>
- May 2011** Android hits 100 million activated Android devices.<sup>39</sup>
- May 2011** Google announces Android@Home, “a software framework for Android that allows programmers to interact with various connected appliances such as light bulbs, thermostats, washing machines and more,” at Google I/O.<sup>40</sup>
- Apr. 16, 2012** Trial begins in the matter of *Oracle v. Google*. The jury and court hear testimony from 24 witnesses.<sup>41</sup>
- May 7, 2012** The jury returned a verdict finding that Google infringed Oracle’s copyrights for the 37 asserted Java API packages and in the nine lines of the rangeCheck code. The jury deadlocked on Google’s fair use defense.<sup>42</sup>
- May 31, 2012** U.S. District Court for the Northern District of California issues preliminary decision finding “that the replicated elements of the Java API packages – including the declarations and their structure, sequence, and organization-were not copyrightable.”<sup>43</sup>
- Jun 20, 2012** The U.S. District Court for the Northern District of California enters final judgment in favor of Google and against Oracle on its claim for copyright infringement, except with respect to the rangeCheck function and the eight decompiled files.<sup>44</sup>
- 2012** Android cumulative activations exceed 500 million.<sup>45</sup>
- 2013** Android cumulative activations exceed 1 billion.<sup>46</sup>
- May 9, 2014** The United States Court of Appeals for the Federal Circuit (“CAFC”) issues opinion concluding “that the declaring code and the structure, sequence, and organization of the API packages are entitled to copyright protection.”<sup>47</sup> The CAFC reversed the U.S. District Court

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<sup>37</sup> Plaintiff Oracle’s Supplemental Complaint, August 12, 2015, p. 3, (reporting Android has three times the market share of mobile ad traffic as compared to its nearest competitor, iOS).

<sup>38</sup> <http://www.engadget.com/2010/10/06/logitech-revue-with-google-tv-details-299-for-keyboard-box-i/>; <http://www.cnet.com/products/sony-nxz-gt1-google-tv/>; <http://www.theverge.com/products/nsx-24gt1/2024>; <http://www.theverge.com/products/nsx-40gt1/2018>; <http://www.theverge.com/products/nsx-32gt1/2021>; <http://www.theverge.com/products/nsx-46gt1/2013>.

<sup>39</sup> <https://googleblog.blogspot.com/2011/05/android-momentum-mobile-and-more-at.html>.

<sup>40</sup> [http://www.pcworld.com/article/227611/Google\\_Envisions\\_Automated\\_Home\\_with\\_Android\\_Home.html](http://www.pcworld.com/article/227611/Google_Envisions_Automated_Home_with_Android_Home.html).

<sup>41</sup> *Oracle America, Inc. v. Google Inc.*, 750 F.3d 1339, 1351 (Fed. Cir. 2014).

<sup>42</sup> *Oracle America, Inc. v. Google Inc.*, 750 F.3d 1339, 1352 (Fed. Cir. 2014).

<sup>43</sup> *Oracle America, Inc. v. Google Inc.*, 750 F.3d 1339, 1352 (Fed. Cir. 2014).

<sup>44</sup> *Oracle America, Inc. v. Google Inc.*, 750 F.3d 1339, 1348 (Fed. Cir. 2014).

<sup>45</sup> GOOG-00022382.

<sup>46</sup> GOOG-00022382.

<sup>47</sup> *Oracle America, Inc. v. Google Inc.*, 750 F.3d 1339 at 1348 (Fed. Cir. 2014).

for the Northern District of California with instructions to reinstate the jury's infringement finding as to the 37 Java packages. The CAFC also granted "Oracle's motion for JMOL as to the eight decompiled Java files that Google copied into Android," and denied "Google's motion for JMOL with respect to the rangeCheck function."<sup>48</sup>

**Oct. 2014** Android TV, Google's successor Android-based platform to Google TV, is announced on the Nexus Player, a set-top box device.<sup>49</sup>

**2014** Android cumulative activations exceed 2 billion.<sup>50</sup>

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<sup>48</sup> *Oracle America, Inc. v. Google Inc.*, 750 F.3d 1339 at 1348 (Fed. Cir. 2014).

<sup>49</sup> Nexus Player is Google's first Android TV device, <http://www.theverge.com/2014/10/15/6982375/google-nexus-player-android-tv-set-top-box-announced>.

<sup>50</sup> GOOG-00022382.

*Oracle America, Inc. v. Google, Inc.***SUN MICROSYSTEMS, INC. R&D AS A PERCENT OF REVENUE**

Exhibit 4

	<b>Revenue</b>	<b>R&amp;D</b>	<b>R&amp;D as a Percent of Revenue</b>
1990 [1]	\$2,466,000,000	\$302,000,000	12.2%
1991 [1]	3,221,000,000	356,000,000	11.1%
1992 [1]	3,589,000,000	382,000,000	10.6%
1993 [1]	4,309,000,000	445,000,000	10.3%
1994 [1]	4,690,000,000	455,000,000	9.7%
1995 [2]	5,901,885,000	562,895,000	9.5%
1996 [2]	7,094,751,000	653,044,000	9.2%
1997 [2]	8,598,346,000	825,968,000	9.6%
1998 [3]	9,862,000,000	1,029,000,000	10.4%
1999 [3]	11,806,000,000	1,280,000,000	10.8%
2000 [4]	15,721,000,000	1,630,000,000	10.4%
2001 [4]	18,250,000,000	2,016,000,000	11.0%
2002 [4]	12,496,000,000	1,832,000,000	14.7%
2003 [4]	11,434,000,000	1,837,000,000	16.1%
2004 [4]	11,185,000,000	1,926,000,000	17.2%
2005 [5]	11,070,000,000	1,785,000,000	16.1%
2006 [5]	13,068,000,000	2,046,000,000	15.7%
2007 [5]	13,873,000,000	2,008,000,000	14.5%
2008 [5]	13,880,000,000	1,834,000,000	13.2%
2009 [5]	11,449,000,000	1,648,000,000	14.4%
Total	<u><u>\$193,963,982,000</u></u>	<u><u>\$24,852,907,000</u></u>	<u><u>12.8%</u></u>

**Notes:**

[1] Sun Microsystems, Inc. SEC Form 10-K for the fiscal year ended June 30, 1994, Exhibit 13, p. 1.

[2] Sun Microsystems, Inc. SEC Form 10-K for the fiscal year ended June 30, 1997, Exhibit 11, p. 26.

[3] Sun Microsystems, Inc. SEC Form 10-K for the fiscal year ended June 30, 2002, p. 21.

[4] Sun Microsystems, Inc. SEC Form 10-K for the fiscal year ended June 30, 2004, p. 17.

[5] Sun Microsystems, Inc. SEC Form 10-K for the fiscal year ended June 30, 2009, p. 25.

*Oracle America, Inc. v. Google, Inc.***ORACLE STATEMENT OF OPERATIONS**

Exhibit 5

<i>(in millions)</i>	<u>FY 2010 [1]</u>	<u>FY 2011 [1]</u>	<u>FY 2012 [1]</u>	<u>FY 2013 [2]</u>	<u>FY 2014 [2]</u>	<u>FY 2015 [2]</u>
Revenues						
New Software Licenses	\$7,533	\$9,235	\$9,906	\$9,411	\$9,416	\$8,535
Cloud Software as a Service and Platform as a Service	n/a	n/a	n/a	910	1,121	1,485
Cloud Infrastructure as a Service	n/a	n/a	n/a	457	456	608
Software License Updates and Product Support	<u>13,092</u>	<u>14,796</u>	<u>16,210</u>	<u>17,142</u>	<u>18,206</u>	<u>18,847</u>
Software and Cloud Revenues	\$20,625	\$24,031	\$26,116	\$27,920	\$29,199	\$29,475
Hardware Systems Products	\$1,506	\$4,382	\$3,827	\$3,033	\$2,976	\$2,825
Hardware Systems Support	<u>784</u>	<u>2,562</u>	<u>2,475</u>	<u>2,313</u>	<u>2,396</u>	<u>2,380</u>
Hardware Systems Revenues	\$2,290	\$6,944	\$6,302	\$5,346	\$5,372	\$5,205
Services Revenues	<u>\$3,905</u>	<u>\$4,647</u>	<u>\$4,703</u>	<u>\$3,914</u>	<u>\$3,704</u>	<u>\$3,546</u>
Total Revenues	<u>\$26,820</u>	<u>\$35,622</u>	<u>\$37,121</u>	<u>\$37,180</u>	<u>\$38,275</u>	<u>\$38,226</u>
Operating Expenses						
Sales and Marketing	\$5,080	\$6,579	\$7,127	\$7,062	\$7,567	\$7,655
Cloud Software as a Service and Platform as a Service	n/a	n/a	n/a	327	455	773
Cloud Infrastructure as a Service	n/a	n/a	n/a	304	308	344
Software License Updates and Product Support	1,063	1,264	1,226	1,175	1,162	1,199
Hardware Systems Products	880	2,057	1,843	1,501	1,521	1,471
Hardware Systems Support	423	1,259	1,046	890	836	816
Services	3,398	3,818	3,743	3,182	2,954	2,929
Research and Development	3,254	4,519	4,523	4,850	5,151	5,524
General and Administrative	911	970	1,126	1,072	1,038	1,077
Amortization of Intangible Assets	1,973	2,428	2,430	2,385	2,300	2,149
Acquisition Related and Other	154	208	56	-604	41	211
Restructuring	<u>622</u>	<u>487</u>	<u>295</u>	<u>352</u>	<u>183</u>	<u>207</u>
Total Operating Expenses	<u>\$17,758</u>	<u>\$23,589</u>	<u>\$23,415</u>	<u>\$22,496</u>	<u>\$23,516</u>	<u>\$24,355</u>

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*Oracle America, Inc. v. Google, Inc.***ORACLE STATEMENT OF OPERATIONS**

Exhibit 5

<i>(in millions)</i>	<u>FY 2010 [1]</u>	<u>FY 2011 [1]</u>	<u>FY 2012 [1]</u>	<u>FY 2013 [2]</u>	<u>FY 2014 [2]</u>	<u>FY 2015 [2]</u>
Operating Income	\$9,062	\$12,033	\$13,706	\$14,684	\$14,759	\$13,871
<i>Operating Income %</i>	<i>33.8%</i>	<i>33.8%</i>	<i>36.9%</i>	<i>39.5%</i>	<i>38.6%</i>	<i>36.3%</i>
Interest Expense	-754	-808	-766	-797	-914	-1,143
Non-Operating Income (Expense), Net	<u>-65</u>	<u>186</u>	<u>22</u>	<u>11</u>	<u>-141</u>	<u>106</u>
Income Before Provision for Income Taxes	\$8,243	\$11,411	\$12,962	\$13,898	\$13,704	\$12,834
Provision for Income Taxes	2,108	2,864	2,981	2,973	2,749	2,896
Net Income	<u>\$6,135</u>	<u>\$8,547</u>	<u>\$9,981</u>	<u>\$10,925</u>	<u>\$10,955</u>	<u>\$9,938</u>
<i>Net Income %</i>	<i>22.9%</i>	<i>24.0%</i>	<i>26.9%</i>	<i>29.4%</i>	<i>28.6%</i>	<i>26.0%</i>

**Notes:**

[1] Oracle Annual Report, 10-K for fiscal year ended May 31, 2012, p. 85.

[2] Oracle Annual Report, 10-K for fiscal year ended May 31, 2015, p. 87.

*Oracle America, Inc. v. Google, Inc.***GOOGLE ANNUAL STATEMENTS OF INCOME**

Revised Exhibit 6 (Revised February 29, 2016)

<i>(in millions)</i>	<u>2008 [1]</u>	<u>2009 [2]</u>	<u>2010 [2]</u>	<u>2011 [2]</u>	<u>2012 [3]</u>	<u>2013 [4]</u>	<u>2014 [4]</u>	<u>2015 [4]</u>
Advertising Revenues								
Google Websites	\$14,414	\$15,723	\$19,444	\$26,145	\$31,221	\$37,422	\$45,085	\$52,357
Google Network Member's Websites [5]	6,715	7,166	8,792	10,386	12,465	13,650	14,539	15,033
Total Advertising Revenues	21,129	22,889	28,236	36,531	43,686	51,072	59,624	67,390
Other Revenues [6]	667	762	1,085	1,374	2,353	4,447	6,377	7,599
Total Revenue	<u>\$21,796</u>	<u>\$23,651</u>	<u>\$29,321</u>	<u>\$37,905</u>	<u>\$46,039</u>	<u>\$55,519</u>	<u>\$66,001</u>	<u>\$74,989</u>
Cost and Expenses								
Cost of Revenues	\$8,622	\$8,844	\$10,417	\$13,188	\$17,176	\$21,993	\$25,691	\$28,164
Research & Development	2,793	2,843	3,762	5,162	6,083	7,137	9,832	12,282
Sales and Marketing	1,946	1,984	2,799	4,589	5,465	6,554	8,131	9,047
General and Administrative	1,803	1,668	1,962	2,724	3,481	4,432	5,851	6,136
Charge - Resolution of DOJ Investigation	-	-	-	500	-	-	-	-
Total Costs and Expenses	<u>\$ 15,164</u>	<u>\$ 15,339</u>	<u>\$ 18,940</u>	<u>\$ 26,163</u>	<u>\$ 32,205</u>	<u>\$ 40,116</u>	<u>\$ 49,505</u>	<u>\$ 55,629</u>
Income from Operations	\$6,632	\$8,312	\$10,381	\$11,742	\$13,834	\$15,403	\$16,496	\$19,360
Impairment of Equity Investments	-1,095	-	-	-	-	-	-	-
Interest and Other Income, Net	316	69	415	584	635	496	763	291
Income from Continuing Ops Before I.T.	\$5,854	\$8,381	\$10,796	\$12,326	\$14,469	\$15,899	\$17,259	\$19,651
Provision for Income Taxes	1,627	1,861	2,291	2,589	2,916	2,739	3,639	3,303
Net Income from Continuing Operations	\$4,227	\$6,520	\$8,505	\$9,737	\$11,553	\$13,160	\$13,620	\$16,348
Net Income (Loss) from Discontinued Ops	-	-	-	-	-816	-427	516	-
Net Income	<u>\$4,227</u>	<u>\$6,520</u>	<u>\$8,505</u>	<u>\$9,737</u>	<u>\$10,737</u>	<u>\$12,733</u>	<u>\$14,136</u>	<u>\$16,348</u>

*Oracle America, Inc. v. Google, Inc.*

**GOOGLE ANNUAL STATEMENTS OF INCOME**

Revised Exhibit 6 (Revised February 29, 2016)

**Notes:**

- [1] Google Annual Report, 10-K for year ended December 31, 2008, pp. 42, 65.
- [2] Google Annual Report, 10-K for year ended December 31, 2011, pp. 30, 52.
- [3] Google Annual Report, 10-K for year ended December 31, 2014, pp. 23, 44.
- [4] Google Annual Report, 10-K for year ended December 31, 2015, pp. 25, 49.
- [5] Revenues from Google Network Members' Websites include revenues generated primarily through advertising programs including AdSense for Search, AdSense for Content, AdExchange, AdMob, and DoubleClick Bid Manager. Google Annual Report, 10-K for year ended December 31, 2014, p. 23.
- [6] Other Revenues are mostly attributable to digital content products, such as apps, music, and movies on the Google Play store. "Other Bets revenues" has been included in "Other Revenues". I understand that Google reclassified certain 2013 and 2014 revenue related to DoubleClick ad serving software from Google Other Revenues to Advertising Revenues from Google Network Member's Websites. See Google Annual Report, 10-K for year ended December 31, 2015, p. 25.

Oracle America, Inc. v. Google, Inc.

**SUMMARY OF ANDROID REPORTED OPERATING RESULTS**

Revised Exhibit 7 (Revised February 29, 2016)

<i>(in millions)</i>	<u>2008 [1]</u>	<u>2009 [2]</u>	<u>2010 [3]</u>	<u>2011 [4]</u>	<u>2012 [4]</u>	<u>2013 [4]</u>	<u>2014 [4]</u>	<u>2015 [4]</u>	<u>Total</u>
<b>Revenue</b>									
Ad Revenue [5]	\$0.7	\$15.7	\$120.1	\$569.4	\$2,152.4	\$4,659.5			\$28,957.1
Apps	n/a	1.1	8.0	36.2	136.1	1,435.5			7,972.2
Digital Content	0.0	0.0	0.0	14.8	105.8	297.5			1,656.7
Hardware	<u>0.0</u>	<u>0.0</u>	<u>115.2</u>	<u>0.0</u>	<u>303.5</u>	<u>834.7</u>			<u>1,980.4</u>
Total Revenue	0.7	16.8	243.3	620.4	2,697.8	7,227.2			40,566.4
<b>Cost of Sales</b>									
Traffic Acquisition Costs [6]	\$0.2	\$2.9	\$41.3	\$85.0	\$460.5	\$1,082.9			\$6,330.4
Apps	0.0	0.0	0.0	0.0	62.2	854.9			2,866.0
Digital Content	0.0	0.0	0.0	23.5	169.5	376.4			1,877.4
Hardware	0.0	0.0	109.9	-0.2	340.6	1,001.8			2,427.4
Infrastructure & Other COS	<u>0.2</u>	<u>0.8</u>	<u>4.3</u>	<u>67.9</u>	<u>95.0</u>	<u>123.1</u>			<u>1,022.6</u>
Total Cost of Sales	0.4	3.7	155.5	176.2	1,127.7	3,439.1			14,523.8
Gross Profit	\$0.3	\$13.1	\$87.8	\$444.2	\$1,570.0	\$3,788.1			\$26,042.6
<b>Direct Operating Expenses</b>									
Sales and Other	\$0.9	\$3.2	\$5.2	\$16.3	\$37.3	\$43.2			\$412.7
Marketing	12.3	16.6	53.3	53.9	225.3	476.1			2,239.2
Engineering (EngPM)	86.3	43.1	107.7	192.3	380.4	464.6			2,643.5
Legal	<u>1.0</u>	<u>2.1</u>	<u>32.2</u>	<u>160.5</u>	<u>113.7</u>	<u>132.6</u>			<u>889.3 [7]</u>
Total Expenses	\$100.5	\$65.0	\$198.4	\$423.0	\$756.7	\$1,116.5			\$6,184.7
Product Contribution	<u>-\$100.2</u>	<u>-\$51.9</u>	<u>-\$110.6</u>	<u>\$21.2</u>	<u>\$813.3</u>	<u>\$2,671.6</u>			<u>\$19,857.9</u>
<i>Contribution Margin as % of Gross Rev</i>			<i>-45.5%</i>	<i>3.4%</i>	<i>30.1%</i>	<i>37.0%</i>			<i>49.0%</i>

*Oracle America, Inc. v. Google, Inc.*

**SUMMARY OF ANDROID REPORTED OPERATING RESULTS**

Revised Exhibit 7 (Revised February 29, 2016)

**Notes:**

- [1] Android OC Quarterly Review - Q1 2009, GOOGLE-00303725 at 739.
- [2] Android OC Quarterly Review - Q4 2010, October 12, 2010, GOOGLE-01-00053552 at 556.
- [3] Android OC Quarterly Review - Q1 2011, May 03, 2011, GOOGLE-77-00053555 at 562.
- [4] GOOG-00103813 - Android Profit and Loss for years 2011 to 2015, Q4 2015 amounts are Google forecasts.
- [5] Exhibit 8.
- [6] For 2011 - 2015, see Exhibit 7.2. Includes Traffic Acquisition Costs for AdSense and Display.
- [7] According to Dr. Leonard, "Total Android legal expenses include a conservative deduction of \$100 million for legal expenses from the previous Google-Oracle litigation." (see Notes to Leonard Exhibit 1a.1). Consistent with this disclosure, I have reduced total Legal Expense by \$100 million.

*Oracle America, Inc. v. Google, Inc.*

**CALCULATION OF ANDROID ESTIMATED NETWORK MEMBER TRAFFIC ACQUISITION COSTS**

Revised Exhibit 7.1 (Revised February 29, 2016)

<i>(in millions)</i>	<u>2011 [1]</u>	<u>2012 [2]</u>	<u>2013 [3]</u>	<u>2014 [3]</u>	<u>2015 [3]</u>
Google Total Ad Revenue	\$36,531.0	\$43,686.0	\$51,072.0	\$59,624.0	\$67,390.0
Total Network Member TAC	<u>\$7,294.0</u>	<u>\$8,791.0</u>	<u>\$9,293.0</u>	<u>\$9,864.0</u>	<u>\$10,242.0</u>
Network Member TAC as % of Ad Revenue	20.0%	20.1%	18.2%	16.5%	15.2%
Android Total Ad Revenue [4]	<u>\$569.4</u>	<u>\$2,152.4</u>	<u>\$4,659.5</u>	<u>████████</u>	<u>████████</u>
Android Network Member TAC	<u><u>\$113.7</u></u>	<u><u>\$433.1</u></u>	<u><u>\$847.8</u></u>	<u><u>████████</u></u>	<u><u>████████</u></u>

**Notes:**

[1] Google Annual Report, 10-K for year ended December 31, 2011, p. 30 and 33.

[2] Google Annual Report, 10-K for year ended December 31, 2014, p. 23 and 26.

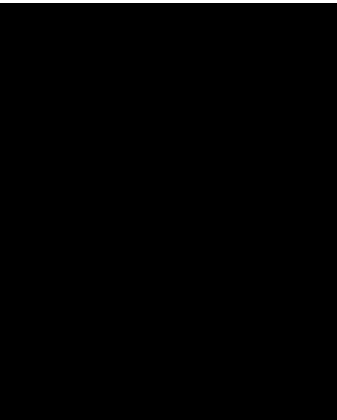
[3] Google Annual Report, 10-K for year ended December 31, 2015, p. 25 and 31.

[4] Revised Exhibit 7 (Revised February 29, 2016).

*Oracle America, Inc. v. Google, Inc.*

**CALCULATION OF ANDROID-RELATED ADSENSE AND DISPLAY TRAFFIC ACQUISITION COSTS**

Exhibit 7.2 (Created February 29, 2016)

<i>(in millions)</i>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>	<u>2015 [4]</u>
Android AdSense Ad Revenue [1]	\$43.2	\$238.6	\$424.9		
AdSense TAC Percentage [2]	70.7%	71.1%	73.1%		
Android AdSense TAC	\$30.5	\$169.6	\$310.7		
Android Display Ad Revenue [1]	\$88.3	\$468.9	\$1,212.9		
Display TAC Percentage [3]	61.6%	62.0%	63.7%		
Android Display TAC	\$54.4	\$290.9	\$772.1		
Total AdSense and Display TAC	<u>\$85.0</u>	<u>\$460.5</u>	<u>\$1,082.9</u>		

**Notes:**

[1] Revised Exhibit 8.1 (Revised February 29, 2016).

[2] Exhibit 7.3.

[3] Exhibit 7.4.

[4] 2015 TAC percentages reflect 2014 figures.

*Oracle America, Inc. v. Google, Inc.*

**CALCULATION OF GOOGLE'S ANNUAL ADSENSE TAC PERCENTAGE - 2008 TO 2014 [1]**

Exhibit 7.3 (Created February 29, 2016)

<b>Month</b>	<b>AdSense Revenue</b>	<b>AdSense TAC</b>	<b>% TAC</b>
January-08	\$354,766,334	\$280,954,158	79.2%
February-08	328,794,753	263,755,996	80.2%
March-08	336,747,508	273,786,213	81.3%
April-08	317,648,977	259,135,989	81.6%
May-08	320,918,073	259,334,046	80.8%
June-08	322,206,439	258,888,462	80.3%
July-08	337,111,057	269,113,984	79.8%
August-08	321,785,896	261,258,787	81.2%
September-08	314,115,698	249,184,327	79.3%
October-08	317,997,964	252,082,993	79.3%
November-08	304,778,598	242,572,365	79.6%
December-08	350,654,179	244,721,484	69.8%
Total/Average-08	\$3,927,525,476	\$3,114,788,804	79.3%
January-09	\$318,596,092	\$241,922,022	75.9%
February-09	284,020,705	217,933,835	76.7%
March-09	339,982,604	237,829,613	70.0%
April-09	306,781,340	221,801,528	72.3%
May-09	315,190,742	233,922,214	74.2%
June-09	338,024,719	242,997,395	71.9%
July-09	334,240,841	247,846,605	74.2%
August-09	326,868,865	243,777,106	74.6%
September-09	344,471,586	247,180,149	71.8%
October-09	352,756,660	256,209,876	72.6%
November-09	371,867,945	269,411,660	72.4%
December-09	376,104,935	273,666,190	72.8%
Total/Average-09	\$4,008,907,034	\$2,934,498,193	73.2%

*Oracle America, Inc. v. Google, Inc.*

**CALCULATION OF GOOGLE'S ANNUAL ADSENSE TAC PERCENTAGE - 2008 TO 2014 [1]**

Exhibit 7.3 (Created February 29, 2016)

<u>Month</u>	<u>AdSense Revenue</u>	<u>AdSense TAC</u>	<u>% TAC</u>
January-10	\$370,539,339	\$267,543,298	72.2%
February-10	340,116,313	241,751,532	71.1%
March-10	378,539,098	270,594,262	71.5%
April-10	350,040,327	247,795,293	70.8%
May-10	361,883,997	260,242,069	71.9%
June-10	368,894,898	253,923,283	68.8%
July-10	383,161,302	259,951,014	67.8%
August-10	367,863,135	258,934,725	70.4%
September-10	378,308,664	258,863,848	68.4%
October-10	393,584,959	275,266,158	69.9%
November-10	417,797,348	296,763,669	71.0%
December-10	418,839,717	287,698,052	68.7%
Total/Average-10	<u>\$4,529,569,097</u>	<u>\$3,179,327,203</u>	<u>70.2%</u>
January-11	\$398,066,040	\$281,287,171	70.7%
February-11	371,462,535	265,749,894	71.5%
March-11	409,531,866	289,307,436	70.6%
April-11	380,873,992	269,752,646	70.8%
May-11	393,248,050	280,225,996	71.3%
June-11	406,270,683	283,580,228	69.8%
July-11	415,334,556	289,885,628	69.8%
August-11	412,027,933	292,416,100	71.0%
September-11	413,009,990	294,131,680	71.2%
October-11	438,369,219	306,480,461	69.9%
November-11	475,388,284	338,452,919	71.2%
December-11	486,424,533	342,865,480	70.5%
Total/Average-11	<u>\$5,000,007,681</u>	<u>\$3,534,135,639</u>	<u>70.7%</u>

*Oracle America, Inc. v. Google, Inc.*

**CALCULATION OF GOOGLE'S ANNUAL ADSENSE TAC PERCENTAGE - 2008 TO 2014 [1]**

Exhibit 7.3 (Created February 29, 2016)

<b>Month</b>	<b>AdSense Revenue</b>	<b>AdSense TAC</b>	<b>% TAC</b>
January-12	\$494,967,930	\$350,198,622	70.8%
February-12	476,094,051	339,795,511	71.4%
March-12	496,565,628	352,338,363	71.0%
April-12	480,658,800	342,740,442	71.3%
May-12	484,418,039	348,485,945	71.9%
June-12	511,679,153	352,806,124	69.0%
July-12	514,009,143	366,326,728	71.3%
August-12	508,941,366	364,628,376	71.6%
September-12	527,981,612	369,200,074	69.9%
October-12	538,775,292	383,929,613	71.3%
November-12	546,775,132	395,654,562	72.4%
December-12	543,571,144	386,131,453	71.0%
Total/Average-12	\$6,124,437,290	\$4,352,235,813	71.1%
January-13	\$537,031,322	\$387,403,727	72.1%
February-13	488,589,005	354,935,019	72.6%
March-13	522,284,920	377,097,828	72.2%
April-13	499,288,925	361,758,833	72.5%
May-13	492,439,848	364,740,215	74.1%
June-13	483,503,746	356,556,278	73.7%
July-13	477,897,955	350,459,387	73.3%
August-13	457,182,386	335,179,728	73.3%
September-13	437,783,161	319,603,910	73.0%
October-13	477,070,195	335,127,832	70.2%
November-13	449,305,538	345,737,930	76.9%
December-13	454,061,203	335,600,011	73.9%
Total/Average-13	\$5,776,438,204	\$4,224,200,698	73.1%

*Oracle America, Inc. v. Google, Inc.*

**CALCULATION OF GOOGLE'S ANNUAL ADSENSE TAC PERCENTAGE - 2008 TO 2014 [1]**

Exhibit 7.3 (Created February 29, 2016)

<b>Month</b>	<b>AdSense Revenue</b>	<b>AdSense TAC</b>	<b>% TAC</b>
January-14			
February-14			
March-14			
April-14			
May-14			
June-14			
July-14			
August-14			
September-14			
October-14			
November-14			
December-14			
Total/Average-14			

**Notes:**

[1] GOOG-00022381.

*Oracle America, Inc. v. Google, Inc.***CALCULATION OF GOOGLE'S ANNUAL ADWORDS TAC PERCENTAGE - 2011 TO 2014 [1]**

Exhibit 7.4 (Created February 29, 2016)

<u>Month</u>	<u>AdWords Revenue</u>	<u>AdWords TAC</u>	<u>% TAC</u>
January-11	\$1,901,914,713	\$113,434,963	6.0%
February-11	1,786,355,978	107,981,360	6.0%
March-11	1,988,145,447	115,203,534	5.8%
April-11	1,859,967,672	113,774,792	6.1%
May-11	2,088,636,387	121,623,953	5.8%
June-11	2,025,114,370	120,051,277	5.9%
July-11	2,117,262,137	126,122,125	6.0%
August-11	2,184,320,558	89,190,207	4.1%
September-11	2,163,244,368	88,853,180	4.1%
October-11	2,171,987,782	96,827,280	4.5%
November-11	2,387,267,820	110,259,628	4.6%
December-11	2,353,780,525	129,378,179	5.5%
Total/Average-11	\$25,027,997,757	\$1,332,700,478	5.3%
January-12	\$2,382,142,572	\$132,090,479	5.5%
February-12	2,205,195,035	122,260,879	5.5%
March-12	2,389,203,889	135,371,461	5.7%
April-12	2,311,763,362	137,074,152	5.9%
May-12	2,449,085,173	146,600,172	6.0%
June-12	2,398,550,687	151,299,945	6.3%
July-12	2,454,957,715	158,690,461	6.5%
August-12	2,423,194,955	160,421,096	6.6%
September-12	2,436,312,858	164,534,300	6.8%
October-12	2,580,995,690	169,912,109	6.6%
November-12	2,783,394,126	188,812,299	6.8%
December-12	2,712,007,444	197,401,972	7.3%
Total/Average-12	\$29,526,803,506	\$1,864,469,325	6.3%

*Oracle America, Inc. v. Google, Inc.***CALCULATION OF GOOGLE'S ANNUAL ADWORDS TAC PERCENTAGE - 2011 TO 2014 [1]**

Exhibit 7.4 (Created February 29, 2016)

<u>Month</u>	<u>AdWords Revenue</u>	<u>AdWords TAC</u>	<u>% TAC</u>
January-13	\$2,803,639,677	\$205,523,323	7.3%
February-13	2,592,427,028	188,165,688	7.3%
March-13	2,767,210,916	205,995,279	7.4%
April-13	2,705,851,719	202,020,500	7.5%
May-13	2,779,812,570	213,327,054	7.7%
June-13	2,771,018,218	210,671,717	7.6%
July-13	2,934,757,859	216,627,909	7.4%
August-13	2,925,226,895	231,513,899	7.9%
September-13	2,918,564,758	225,489,231	7.7%
October-13	3,031,025,519	221,505,085	7.3%
November-13	3,322,527,669	248,188,827	7.5%
December-13	3,344,302,145	269,028,099	8.0%
Total/Average-13	\$34,896,364,973	\$2,638,056,611	7.6%
January-14			
February-14			
March-14			
April-14			
May-14			
June-14			
July-14			
August-14			
September-14			
October-14			
November-14			
December-14			
Total/Average-14			

**Notes:**

[1] GOOG-00022380.

*Oracle America, Inc. v. Google, Inc.***CALCULATION OF GOOGLE'S ANNUAL DISPLAY TAC PERCENTAGE - 2008 TO 2014 [1]**

Exhibit 7.5 (Created February 29, 2016)

<b>Month</b>	<b>Display Revenue</b>	<b>Display TAC</b>	<b>% TAC</b>
January-08	\$217,576,130	\$163,908,013	75.3%
February-08	204,379,671	152,880,448	74.8%
March-08	256,221,120	170,414,169	66.5%
April-08	249,199,856	164,688,445	66.1%
May-08	261,717,900	169,716,052	64.8%
June-08	260,799,994	166,439,925	63.8%
July-08	266,207,121	170,860,908	64.2%
August-08	257,425,365	168,551,837	65.5%
September-08	265,384,101	159,630,113	60.2%
October-08	276,307,993	179,934,795	65.1%
November-08	264,307,956	164,493,987	62.2%
December-08	268,353,361	168,087,428	62.6%
Total/Average-08	\$3,047,880,568	\$1,999,606,120	65.6%
January-09	\$254,915,106	\$168,696,724	66.2%
February-09	244,011,821	153,853,002	63.1%
March-09	267,024,295	171,472,471	64.2%
April-09	257,457,168	162,655,609	63.2%
May-09	270,411,961	167,477,860	61.9%
June-09	266,674,429	173,161,138	64.9%
July-09	272,679,513	176,470,894	64.7%
August-09	280,657,282	178,366,352	63.6%
September-09	293,854,217	182,383,521	62.1%
October-09	318,557,705	194,578,909	61.1%
November-09	317,924,770	198,484,596	62.4%
December-09	334,118,808	204,426,193	61.2%
Total/Average-09	\$3,378,287,075	\$2,132,027,269	63.1%

*Oracle America, Inc. v. Google, Inc.***CALCULATION OF GOOGLE'S ANNUAL DISPLAY TAC PERCENTAGE - 2008 TO 2014 [1]**

Exhibit 7.5 (Created February 29, 2016)

<b>Month</b>	<b>Display Revenue</b>	<b>Display TAC</b>	<b>% TAC</b>
January-10	\$329,971,916	\$205,343,052	62.2%
February-10	308,430,842	187,565,804	60.8%
March-10	348,379,334	207,575,499	59.6%
April-10	322,995,267	208,854,879	64.7%
May-10	334,709,101	212,125,549	63.4%
June-10	341,305,412	213,469,786	62.5%
July-10	339,205,245	208,728,018	61.5%
August-10	351,940,329	211,507,442	60.1%
September-10	369,408,147	227,997,510	61.7%
October-10	403,547,624	245,541,987	60.8%
November-10	411,419,084	256,608,760	62.4%
December-10	426,147,683	258,247,221	60.6%
Total/Average-10	\$4,287,459,984	\$2,643,565,507	61.7%
January-11	\$409,610,069	\$255,726,916	62.4%
February-11	394,834,231	240,224,784	60.8%
March-11	428,631,178	265,779,345	62.0%
April-11	409,988,285	250,131,860	61.0%
May-11	433,977,203	271,511,609	62.6%
June-11	441,289,049	273,900,144	62.1%
July-11	434,075,802	269,890,179	62.2%
August-11	458,222,662	282,388,567	61.6%
September-11	440,584,300	276,264,123	62.7%
October-11	447,168,707	262,234,280	58.6%
November-11	482,668,251	302,400,453	62.7%
December-11	495,823,814	302,004,326	60.9%
Total/Average-11	\$5,276,873,551	\$3,252,456,586	61.6%

*Oracle America, Inc. v. Google, Inc.***CALCULATION OF GOOGLE'S ANNUAL DISPLAY TAC PERCENTAGE - 2008 TO 2014 [1]**

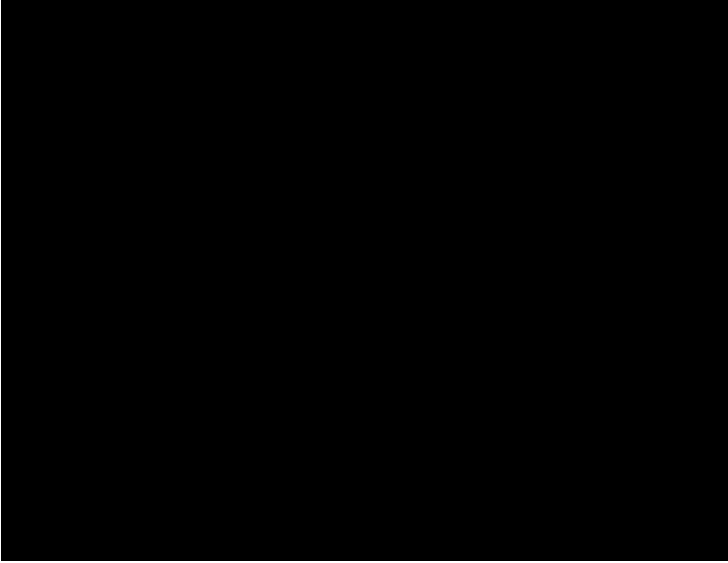
Exhibit 7.5 (Created February 29, 2016)

<b>Month</b>	<b>Display Revenue</b>	<b>Display TAC</b>	<b>% TAC</b>
January-12	\$467,698,345	\$299,600,705	64.1%
February-12	457,867,276	274,633,972	60.0%
March-12	493,453,997	298,984,584	60.6%
April-12	495,011,574	303,991,940	61.4%
May-12	493,735,373	301,957,117	61.2%
June-12	497,725,643	307,504,664	61.8%
July-12	508,446,961	319,062,440	62.8%
August-12	509,990,833	319,841,023	62.7%
September-12	533,170,214	330,633,499	62.0%
October-12	568,505,351	355,158,241	62.5%
November-12	586,876,324	367,102,718	62.6%
December-12	624,964,460	391,396,067	62.6%
Total/Average-12	\$6,237,446,351	\$3,869,866,970	62.0%
January-13	\$593,810,439	\$377,755,803	63.6%
February-13	565,285,752	352,289,111	62.3%
March-13	632,238,096	385,653,928	61.0%
April-13	551,024,736	385,998,161	70.1%
May-13	635,048,160	402,043,070	63.3%
June-13	592,549,105	384,861,913	65.0%
July-13	611,237,077	386,496,625	63.2%
August-13	598,168,487	378,314,739	63.2%
September-13	619,329,608	385,247,649	62.2%
October-13	725,654,230	433,986,515	59.8%
November-13	696,389,961	464,525,345	66.7%
December-13	768,629,096	494,206,395	64.3%
Total/Average-13	\$7,589,364,747	\$4,831,379,254	63.7%

*Oracle America, Inc. v. Google, Inc.*

**CALCULATION OF GOOGLE'S ANNUAL DISPLAY TAC PERCENTAGE - 2008 TO 2014 [1]**

Exhibit 7.5 (Created February 29, 2016)

<u>Month</u>	<u>Display Revenue</u>	<u>Display TAC</u>	<u>% TAC</u>
January-14			
February-14			
March-14			
April-14			
May-14			
June-14			
July-14			
August-14			
September-14			
October-14			
November-14			
December-14			
Total/Average-14			

**Notes:**

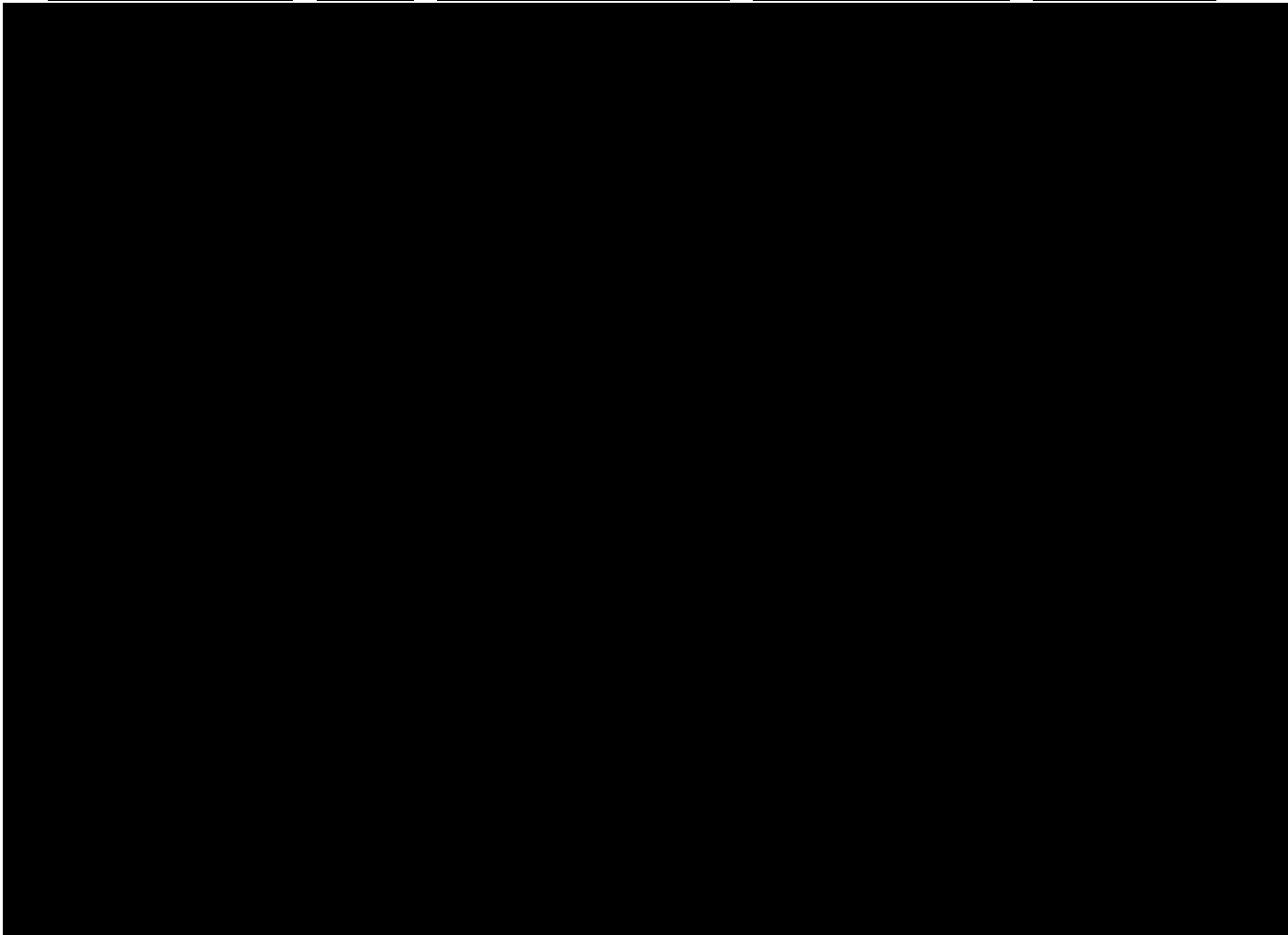
[1] GOOG-00022383.

*Oracle America, Inc. v. Google, Inc.*

**WEIGHTED AVERAGE TAC PAID TO "NON-ANDROID MOBILE OPERATING SYSTEM PARTNERS" [1]**

Exhibit 7.6 (Created February 29, 2016)

<u>Non-Android Mobile Operating System Partner</u>	<u>Year</u>	<u>Total Gross Revenue Earned by Google Under Agreement</u>	<u>% of Search Revenue Google Shares with the Partner</u>	<u>Weighted Average % Paid to Partner</u>
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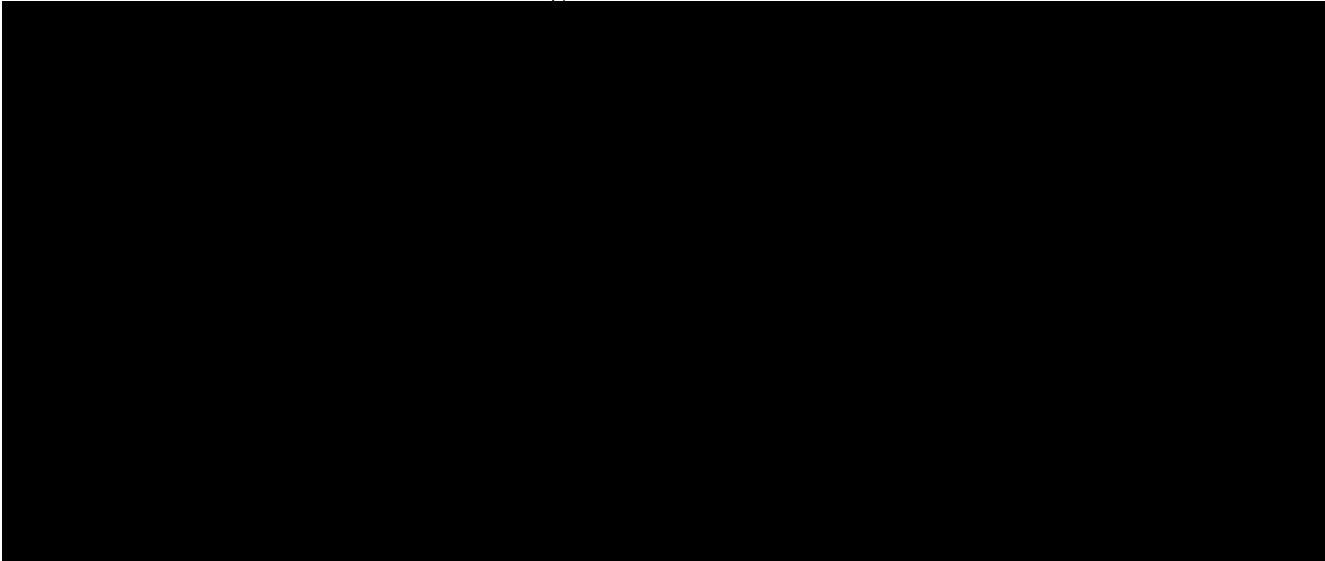
Highly Confidential - Attorneys' Eyes Only

*Oracle America, Inc. v. Google, Inc.*

**WEIGHTED AVERAGE TAC PAID TO "NON-ANDROID MOBILE OPERATING SYSTEM PARTNERS" [1]**

Exhibit 7.6 (Created February 29, 2016)

Non-Android Mobile Operating System Partner	Year	Total Gross Revenue Earned by Google Under Agreement	% of Search Revenue Google Shares with the Partner	Weighted Average % Paid to Partner
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**Notes:**

[1] Case No. CV 10-03561 WHA, Response to Docket No. 1436, entitled:

“Google Search Distribution Agreements with Non-Android Mobile Operating System Partners.”

*Oracle America, Inc. v. Google, Inc.*

**GROSS PROFIT OF OTHER ANDROID REVENUE**

Exhibit 7.7 (Created February 29, 2016)

<i>(in millions)</i>	<u><b>Amount</b></u>
Total Apps Revenue	\$7,972.2
Total Digital Content Revenue	1,656.7
Total Hardware Revenue	<u>1,980.4</u>
 Total Other Android Revenue	 11,609.3
 Less: Apps Cost of Sales	 -\$2,866.0
Less: Digital Content Cost of Sales	-1,877.4
Less: Hardware Cost of Sales	-2,427.4
Less: Infrastructure and Other Cost of Sales	<u>-1,022.6</u>
 Gross Profit of Other Android Revenue	 <u><u>\$3,415.9</u></u>

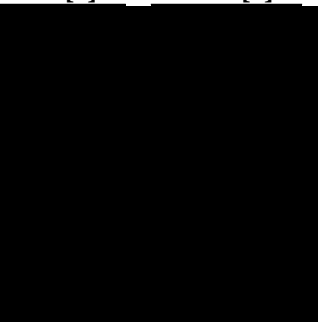
**Notes:**

[1] Revised Exhibit 7.

*Oracle America, Inc. v. Google, Inc.*

**ANDROID TOTAL REVENUE FROM 2008 TO 2015**

Exhibit 8

<i>(in millions)</i>	<u>2008 [1]</u>	<u>2009 [2]</u>	<u>2010 [3]</u>	<u>2011 [4]</u>	<u>2012 [4]</u>	<u>2013 [4]</u>	<u>2014 [4]</u>	<u>2015 [4]</u>	<u>Total</u>
Ads [5]	\$0.7	\$15.7	\$120.1	\$569.4	\$2,152.4	\$4,659.5			\$28,957.1
App Sales	n/a	1.1	8.0	36.2	136.1	1,435.5			7,972.2
Digital Content	n/a	0.0	0.0	14.8	105.8	297.5			1,656.7
Hardware	n/a	0.0	115.2	0.0	303.5	834.7			1,980.4
Total	<u>\$0.7</u>	<u>\$16.8</u>	<u>\$243.3</u>	<u>\$620.4</u>	<u>\$2,697.8</u>	<u>\$7,227.2</u>			<u>\$40,566.4</u>

**Notes:**

[1] Android OC Quarterly Review - Q1 2009, GOOGLE-00303725 at 739.

[2] Android OC Quarterly Review - Q4 2010, October 12, 2010, GOOGLE-01-00053552 at 556.

[3] Android OC Quarterly Review - Q1 2011, May 03, 2011, GOOGLE-77-00053555 at 562.

[4] Android Profit and Loss, GOOG-00103813.

[5] Revised Exhibit 8.1 (Revised February 29, 2016). 2015 Ad Revenue is annualized based on six months ending June 30, 2015.

*Oracle America, Inc. v. Google, Inc.*

**ANDROID AD REVENUE FROM 2008 TO 2015**

Revised Exhibit 8.1 (Revised February 29, 2016)

<i>(in millions)</i>	<u>2008 [1]</u>	<u>2009 [2]</u>	<u>2010 [3]</u>	<u>2011 [4]</u>	<u>2012 [5]</u>	<u>2013 [5]</u>	<u>2014 [5]</u>	<u>2015 [5] [6]</u>	<u>Total</u>
Search (AdWords)	\$0.7	\$11.9	\$80.9	\$437.9	\$1,444.9	\$3,021.7			\$19,393.6
AdSense	-	0.0	6.8	43.2	238.6	424.9			2,051.0
Display	-	3.8	32.4	88.3	468.9	1,212.9			7,512.5
Total Ad Revenue	<u>\$0.7</u>	<u>\$15.7</u>	<u>\$120.1</u>	<u>\$569.4</u>	<u>\$2,152.4</u>	<u>\$4,659.5</u>			<u>\$28,957.1</u>

**Notes:**

[1] Android OC Quarterly Review - Q1 2009, GOOGLE-00303725 at 739; Leonard Exhibit 1c.

[2] Android OC Quarterly Review - Q4 2010, October 12, 2010, GOOGLE-01-00053552 at 556; Leonard Exhibit 1c

[3] Android OC Quarterly Review - Q1 2011, May 03, 2011, GOOGLE-77-00053555 at 562; Leonard Exhibit 1c.

[4] GOOG-00132625, tabs "1. Final - Legal" and "2. Final -Backup" (Cell AI9); Leonard Exhibit 1c.

[5] Android Ad Revenues, GOOG-00022386.

[6] 2015 Ad revenue is annualized based on six months ending June 30, 2015.

*Oracle America, Inc. v. Google, Inc.*

**ANDROID DEVICE WORLDWIDE ANNUAL UNIT SALES**

Revised Exhibit 9 (Revised February 29, 2016)

	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>	<u>2015</u>	<u>Total</u>
Android Phones	-	6,798,400 [1]	67,224,500 [1]	219,440,200 [2]	451,621,000 [3]	761,288,000 [4]	1,004,675,000 [4]	1,160,213,400 [5]	3,671,260,500
Android Tablets	-	-	2,786,000 [6]	18,030,000 [6]	53,341,250 [7]	120,961,445 [7]	154,700,000 [8]	139,800,000 [9]	489,618,695
Total Android Units	-	<u>6,798,400</u>	<u>70,010,500</u>	<u>237,470,200</u>	<u>504,962,250</u>	<u>882,249,445</u>	<u>1,159,375,000</u>	<u>1,300,013,400</u>	<u>4,160,879,195</u>

**Notes:**

[1] <http://www.cnet.com/news/gartner-android-ranks-2nd-in-global-smartphones/>.

[2] [http://www.pcworld.com/article/228218/Gartner\\_Android\\_Dominates\\_Smartphone\\_Sales\\_Worldwide.html](http://www.pcworld.com/article/228218/Gartner_Android_Dominates_Smartphone_Sales_Worldwide.html);  
<http://www.computerweekly.com/news/2240105329/Worldwide-smartphone-sales-grow-74-in-second-quarter-of-2011-says-Gartner>; <http://www.winumors.com/gartner-windows-phone-sales-flat-in-q3-2011/>;  
<http://www.gartner.com/newsroom/id/1924314>.

[3] <http://www.gartner.com/newsroom/id/2665715>.

[4] <http://www.gartner.com/newsroom/id/2996817>.

[5] <http://www.gartner.com/newsroom/id/3061917>; <http://www.gartner.com/newsroom/id/3115517>;  
<http://www.gartner.com/newsroom/id/3169417>; and  
[http://www.gsmarena.com/gartner\\_samsung\\_retains\\_smartphone\\_leadership\\_in\\_2015\\_with\\_over\\_20\\_market\\_share-news-16723.php](http://www.gsmarena.com/gartner_samsung_retains_smartphone_leadership_in_2015_with_over_20_market_share-news-16723.php).

[6] <http://cluster006.ovh.net/~nobeyesco/nobeyscoweb/?q=node/948>.

[7] <http://the-digital-reader.com/2014/03/03/gartner-estimates-195-million-tablets-produced-2013-22-million-fewer-idcs-estimate/>.

[8] <http://venturebeat.com/2015/03/12/idc-tablet-shipment-growth-slows-to-a-crawl-will-grow-just-2-in-2015/>.

[9] <http://www.idc.com/getdoc.jsp?containerId=prUS25867215>; 2015 amounts provided as forecast for the entire year.

*Oracle America, Inc. v. Google, Inc.***SMARTPHONE DEVICE WORLDWIDE ANNUAL UNIT SALES BY VENDOR**

Revised Exhibit 10 (Revised February 29, 2016)

Units	2003 [1]	2004 [1]	2005 [2]	2006 [2]	2007 [3]	2008 [3]	2009 [4]
Palm One	4,171,690	3,726,172	2,773,025	1,970,031	-	-	-
Hewlett-Packard	2,270,086	2,664,151	2,267,178	1,721,531	-	-	-
RIM	604,521	2,178,000	3,193,000	3,510,927	11,767,700	23,149,000	36,445,233
Mio Technology	-	-	714,528	1,515,496	-	-	-
Dell	582,020	693,126	-	-	-	-	-
Sony Ericsson	1,404,289	480,648	-	-	-	-	4,925,031
Sharp	-	-	536,540	1,428,318	6,885,300	5,234,200	-
Nokia	-	-	-	-	60,465,000	60,920,500	66,980,427
Apple	-	-	-	-	3,302,600	11,417,500	24,625,157
HTC	-	-	-	-	3,718,500	5,895,400	8,865,057
Samsung	-	-	-	-	-	-	6,895,044
TCL Comm	-	-	-	-	-	-	-
Lenovo	-	-	-	-	-	-	-
LG Electronics	-	-	-	-	-	-	3,940,025
ZTE	-	-	-	-	-	-	-
Huawei	-	-	-	-	-	-	-
Motorola	-	-	-	-	-	-	6,895,044
Yulong	-	-	-	-	-	-	-
Xiaomi	-	-	-	-	-	-	-
Other	2,490,435	2,544,422	5,497,869	7,596,989	36,176,600	32,671,400	12,805,082
Total	11,523,041	12,286,519	14,982,140	17,743,292	122,315,600	139,287,900	172,376,100
Cumulative	11,523,041	23,809,560	38,791,700	56,534,992	178,850,592	318,138,492	490,514,592

*Oracle America, Inc. v. Google, Inc.***SMARTPHONE DEVICE WORLDWIDE ANNUAL UNIT SALES BY VENDOR**

Revised Exhibit 10 (Revised February 29, 2016)

<b>Units</b>	<b>2010 [4]</b>	<b>2011 [5]</b>	<b>2012 [6]</b>	<b>2013 [7]</b>	<b>2014 [7]</b>	<b>2015 [8]</b>	<b>Total</b>
Palm One	-	-	-	-	-	-	12,640,918
Hewlett-Packard	-	-	-	-	-	-	8,922,946
RIM	47,782,003	49,159,250	-	-	-	-	177,789,634
Mio Technology	-	-	-	-	-	-	2,230,024
Dell	-	-	-	-	-	-	1,275,146
Sony Ericsson	9,954,584	-	-	-	-	-	16,764,552
Sharp	-	-	-	-	-	-	14,084,358
Nokia	99,545,839	74,364,189	-	-	-	-	362,275,955
Apple	47,782,003	89,660,316	130,133,200	150,786,000	191,426,000	225,850,600	874,983,375
HTC	24,886,460	41,847,894	-	-	-	-	85,213,310
Samsung	23,891,001	90,429,932	205,767,100	299,795,000	307,597,000	320,219,700	1,254,594,777
TCL Comm	-	-	-	-	-	-	-
Lenovo	-	-	21,698,500	57,424,000	81,416,000	72,748,200	233,286,700
LG Electronics	6,968,209	-	25,814,100	46,432,000	57,661,000	-	140,815,334
ZTE	-	-	-	-	-	-	-
Huawei	-	-	27,168,700	46,609,000	68,081,000	104,094,700	245,953,400
Motorola	13,936,417	-	-	-	-	-	20,831,461
Yulong	-	-	-	-	-	-	-
Xiaomi	-	-	-	-	-	65,618,600	65,618,600
Other	21,900,085	127,275,319	269,526,600	368,675,000	538,710,000	635,368,500	2,061,238,301
Total	<u>296,646,600</u>	<u>472,736,900</u>	<u>680,108,200</u>	<u>969,721,000</u>	<u>1,244,890,000</u>	<u>1,423,900,300</u>	<u>5,578,517,592</u>
Cumulative	787,161,192	1,259,898,092	1,940,006,292	2,909,727,292	4,154,617,292	5,578,517,592	

*Oracle America, Inc. v. Google, Inc.*

**SMARTPHONE DEVICE WORLDWIDE ANNUAL UNIT SALES BY VENDOR**

Revised Exhibit 10 (Revised February 29, 2016)

**Notes:**

- [1] <http://www.palminfocenter.com/news/7613/gartner-worldwide-pda-shipments-grew-7-in-2004/>.
- [2] <http://www.gartner.com/newsroom/id/500898>.
- [3] <http://www.gartner.com/newsroom/id/910112>.
- [4] Units from [http://www.quirksmode.org/blog/archives/2011/02/smartphone\\_sale.html](http://www.quirksmode.org/blog/archives/2011/02/smartphone_sale.html) multiplied by 98.5% in 2009 and 99.5% in 2010 in order to reconcile the differences in unit totals between the 'by vendor' and 'by operating system' data in exhibits 10 and 11. [Total Units from Revised Exhibit 11 (Revised February 29, 2016) / Total Units from source].
- [5] Units from <http://www.idc.com/getdoc.jsp?containerId=prUS23299912> multiplied by 96.2% in order to reconcile the differences in unit totals between the 'by vendor' and 'by operating system' data in exhibits 10 and 11. [Total Units from Revised Exhibit 11 (Revised February 29, 2016) / Total Units from source].
- [6] <http://www.gartner.com/newsroom/id/2665715>.
- [7] <http://www.gartner.com/newsroom/id/2996817>.
- [8] [http://www.gsmarena.com/gartner\\_samsung\\_retains\\_smartphone\\_leadership\\_in\\_2015\\_with\\_over\\_20\\_market\\_share-news-16723.php](http://www.gsmarena.com/gartner_samsung_retains_smartphone_leadership_in_2015_with_over_20_market_share-news-16723.php).

*Oracle America, Inc. v. Google, Inc.***SMARTPHONE DEVICE WORLDWIDE ANNUAL UNIT SALES BY OPERATING SYSTEM**

Revised Exhibit 11 (Revised February 29, 2016)

<b>Units</b>	<b>2003 [1]</b>	<b>2004 [1]</b>	<b>2005 [2]</b>	<b>2006 [2]</b>	<b>2007 [3]</b>	<b>2008 [3]</b>	<b>2009 [4]</b>
Windows CE	4,344,186	5,283,203	7,173,005	9,954,082	14,698,000	16,498,100	15,031,000
Palm OS	5,761,521	4,460,006	2,960,795	2,074,765	1,762,700	2,507,200	-
RIM	-	-	3,193,000	3,510,927	11,767,700	23,149,000	34,346,600
Symbian	-	-	1,010,000	950,100	77,684,000	72,933,500	80,878,300
iOS	-	-	-	-	3,302,600	11,417,500	24,889,700
Android	-	-	-	-	-	-	6,798,400
Other	1,417,334	2,543,309	645,340	1,253,418	13,100,700	12,782,600	10,432,100
<b>Total</b>	<b>11,523,041</b>	<b>12,286,519</b>	<b>14,982,140</b>	<b>17,743,292</b>	<b>122,315,600</b>	<b>139,287,900</b>	<b>172,376,100</b>

<b>Units</b>	<b>2010 [4]</b>	<b>2011 [5]</b>	<b>2012 [6]</b>	<b>2013 [7]</b>	<b>2014 [7]</b>	<b>2015 [8]</b>	<b>Total</b>
Windows CE	12,378,200	9,843,400	16,940,700	30,714,000	35,133,000	26,738,000	204,728,877
Palm OS	-	-	-	-	-	-	19,526,987
RIM	47,451,600	51,541,900	34,210,300	18,606,000	7,911,000	4,361,900	240,049,927
Symbian	111,576,700	88,410,200	-	-	-	-	433,442,800
iOS	46,598,300	89,263,300	130,133,200	150,786,000	191,426,000	225,850,900	873,667,500
Android	67,224,500	219,440,200	451,621,000	761,288,000	1,004,675,000	1,160,213,400	3,671,260,500
Other	11,417,400	14,238,000	47,203,000	8,327,000	5,745,000	6,736,100	135,841,301
<b>Total</b>	<b>296,646,600</b>	<b>472,736,900</b>	<b>680,108,200</b>	<b>969,721,000</b>	<b>1,244,890,000</b>	<b>1,423,900,300</b>	<b>5,578,517,592</b>

*Oracle America, Inc. v. Google, Inc.*

**SMARTPHONE DEVICE WORLDWIDE ANNUAL UNIT SALES BY OPERATING SYSTEM**

Revised Exhibit 11 (Revised February 29, 2016)

**Notes:**

- [1] Market Share from <http://www.palminfocenter.com/news/7613/gartner-worldwide-pda-shipments-grew-7-in-2004/> multiplied by Total Units from Revised Exhibit 10 (Revised February 29, 2016).
- [2] <http://www.gartner.com/newsroom/id/500898>.
- [3] <http://www.gartner.com/newsroom/id/910112>.
- [4] <http://www.cnet.com/news/gartner-android-ranks-2nd-in-global-smartphones/>.
- [5] [http://www.pcworld.com/article/228218/Gartner\\_Android\\_Dominates\\_Smartphone\\_Sales\\_Worldwide.html](http://www.pcworld.com/article/228218/Gartner_Android_Dominates_Smartphone_Sales_Worldwide.html);  
<http://www.computerweekly.com/news/2240105329/Worldwide-smartphone-sales-grow-74-in-second-quarter-of-2011-says-Gartner>;  
<http://www.winrumors.com/gartner-windows-phone-sales-flat-in-q3-2011/>; <http://www.gartner.com/newsroom/id/1924314>.
- [6] <http://www.gartner.com/newsroom/id/2665715>.
- [7] <http://www.gartner.com/newsroom/id/2996817>.
- [8] <http://www.gartner.com/newsroom/id/3061917>; <http://www.gartner.com/newsroom/id/3115517>; <http://www.gartner.com/newsroom/id/3169417>; and  
[http://www.gsmarena.com/gartner\\_samsung\\_retains\\_smartphone\\_leadership\\_in\\_2015\\_with\\_over\\_20\\_market\\_share-news-16723.php](http://www.gsmarena.com/gartner_samsung_retains_smartphone_leadership_in_2015_with_over_20_market_share-news-16723.php); Other includes 2.2 million units to reconcile to Exhibit 10.
- [9] The 2015 unit total was adjusted by 1,000 units in order to reconcile unit totals to the 'by vendor' data in Exhibit 10.

*Oracle America, Inc. v. Google, Inc.***CALCULATION OF JAVA ME LICENSING LOST PROFITS, 2009-2015**

Exhibit 12

	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>	<u>2015</u>	<u>Total</u>
[1] Lost Java ME Licensing Revenue	\$32,744,771	\$39,741,318	\$28,375,252	\$14,329,644	\$91,350,258			\$557,661,673
[2] Incremental Expenses	<u>5,757,473</u>	<u>6,987,667</u>	<u>2,842,248</u>	<u>1,404,667</u>	<u>8,681,513</u>			<u>82,248,738</u>
Lost Java ME Licensing Profits	<u>\$26,987,299</u>	<u>\$32,753,651</u>	<u>\$25,533,004</u>	<u>\$12,924,977</u>	<u>\$82,668,745</u>			<u>\$475,412,935</u>


**Notes:**

[1] Exhibit 12.2.

[2] Exhibit 12.1.

*Oracle America, Inc. v. Google, Inc.***CALCULATION OF INCREMENTAL EXPENSES**

Exhibit 12.1

	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>	<u>2015</u>	<u>Total</u>
[1] Lost Java ME Revenue	\$32,744,771	\$39,741,318	\$28,375,252	\$14,329,644	\$91,350,258			\$557,661,673
[2] Incremental COGS	7.6%	7.6%	n/a	n/a	n/a			n/a
[2] Incremental Sales Expense	10.0%	10.0%	n/a	n/a	n/a			n/a
[3] Incremental Expense % Total	17.6%	17.6%	10.0%	9.8%	9.5%			14.7%
Incremental Expenses	<u>\$5,757,473</u>	<u>\$6,987,667</u>	<u>\$2,842,248</u>	<u>\$1,404,667</u>	<u>\$8,681,513</u>			<u>\$82,248,738</u>

**Notes:**

[1] Exhibit 12.2.

[2] Exhibit 12.7, Applied 2006 COGS and Sales percentages to years 2009 and 2010.

[3] Exhibit 12.6.

*Oracle America, Inc. v. Google, Inc.***CALCULATION OF LOST JAVA ME LICENSING REVENUE**

Exhibit 12.2

	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>	<u>2015</u>	<u>Total</u>
[1] Java ME Forecasted Licensing Revenue	\$129,696,000	\$140,399,000	\$151,985,252	\$164,527,644	\$178,105,082			\$1,166,229,765
[2] Java ME Licensing Revenue	96,951,229	100,657,682	123,610,000	150,198,000	86,754,824			608,568,092
Lost Java ME Licensing Revenue	<u>\$32,744,771</u>	<u>\$39,741,318</u>	<u>\$28,375,252</u>	<u>\$14,329,644</u>	<u>\$91,350,258</u>			<u>\$557,661,673</u>

**Notes:**

[1] Exhibit 12.3.

[2] Exhibit 12.4.

*Oracle America, Inc. v. Google, Inc.*

**JAVA ME LICENSING REVENUE FORECASTS**

Exhibit 12.3

<i>(in thousands)</i>	<u>2009 [1]</u>	<u>2010 [1]</u>	<u>2011 [2]</u>	<u>2012 [2]</u>	<u>2013 [2]</u>	<u>2014 [2]</u>	<u>2015 [2]</u>	<u>Total</u>
Total Forecasted Licensing Revenue	\$129,696	\$140,399	\$151,985	\$164,528	\$178,105	\$192,803	\$208,714	\$1,166,230
2009-2010 Java ME Licensing Growth Rate	<i>n/a</i>	8.3%	8.3%	8.3%	8.3%	8.3%	8.3%	<i>n/a</i>

**Notes:**

[1] OAGOOGL0100164541.

[2] For 2011 forward, I applied the 2009-2010 growth rate to project licensing revenue.

*Oracle America, Inc. v. Google, Inc.*

**ACTUAL JAVA ME LICENSING REVENUE, 2009-2015**

Exhibit 12.4

	<u>2009 [1]</u>	<u>2010 [1]</u>	<u>2011 [2]</u>	<u>2012 [2]</u>	<u>2013 [2]</u>	<u>2014 [2]</u>	<u>2015 [2]</u>	<u>Total</u>
Java ME Licensing Revenue	\$95,282,235	\$98,922,651	\$123,610,000	\$150,198,000	\$86,754,824			\$605,164,066
Embedded ME Licensing Revenue	<u>1,668,993</u>	<u>1,735,032</u>	<u>-</u>	<u>-</u>	<u>-</u>			<u>3,404,025</u>
Total Java ME Licensing Revenue	<u>\$96,951,229</u>	<u>\$100,657,682</u>	<u>\$123,610,000</u>	<u>\$150,198,000</u>	<u>\$86,754,824</u>			<u>\$608,568,092</u>
<i>Java ME Licensing YoY Growth</i>	<i>n/a</i>	<i>3.8%</i>	<i>22.8%</i>	<i>21.5%</i>	<i>-42.2%</i>			<i>n/a</i>

**Notes:**

[1] OAGOOGL0000702509, tab 'Mapping'.

[2] OAGOOGL02000003713, tab 'Lic Revenue by Product'.

Oracle America, Inc. v. Google, Inc.

**SUMMARY OF ORACLE JAVA ME LICENSING FORECASTS, 2009-2015**

Exhibit 12.5

<i>(in thousands)</i>	<b>October 8 2010 Forecast</b>							<b>Total</b>
	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015 [5]</b>	
[1] Java ME	\$129,696	\$140,399	\$ -	\$ -	\$ -	\$ -	\$ -	\$270,095
[2] Java ME Licensing	-	-	85,000	95,200	119,000	148,750	185,938	633,888
Embedded ME Licensing	-	-	2,000	2,500	3,125	3,906	4,883	16,414
Total Forecasted Licensing Revenue	<u>\$129,696</u>	<u>\$140,399</u>	<u>\$87,000</u>	<u>\$97,700</u>	<u>\$122,125</u>	<u>\$152,656</u>	<u>\$190,820</u>	<u>\$920,397</u>
<i>Java ME Licensing YoY Growth</i>	<i>n/a</i>	<i>8.3%</i>	<i>-38.0%</i>	<i>12.3%</i>	<i>25.0%</i>	<i>25.0%</i>	<i>25.0%</i>	<i>n/a</i>

<i>(in thousands)</i>	<b>October 11 2010 Forecast</b>							<b>Total</b>
	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015 [5]</b>	
[1] Java ME	\$129,696	\$140,399	\$ -	\$ -	\$ -	\$ -	\$ -	\$270,095
[3] Java ME Licensing	-	-	85,000	87,550	94,554	108,737	125,048	500,889
Embedded ME Licensing	-	-	2,000	2,500	3,125	3,906	4,883	16,414
Total Forecasted Licensing Revenue	<u>\$129,696</u>	<u>\$140,399</u>	<u>\$87,000</u>	<u>\$90,050</u>	<u>\$97,679</u>	<u>\$112,643</u>	<u>\$129,930</u>	<u>\$787,398</u>
<i>Java ME Licensing YoY Growth</i>	<i>n/a</i>	<i>8.3%</i>	<i>-38.0%</i>	<i>3.5%</i>	<i>8.5%</i>	<i>15.3%</i>	<i>15.3%</i>	<i>n/a</i>

*Oracle America, Inc. v. Google, Inc.*

**SUMMARY OF ORACLE JAVA ME LICENSING FORECASTS, 2009-2015**

Exhibit 12.5

<i>(in thousands)</i>	January 8 2011 Forecast							Total
	2009	2010	2011	2012	2013	2014	2015 [5]	
[1] Java ME	\$129,696	\$140,399	\$ -	\$ -	\$ -	\$ -	\$ -	\$270,095
[4] Java ME Licensing	-	-	66,331	71,514	78,363	86,357	95,165	397,730
Embedded ME Licensing	-	-	8,873	8,873	10,204	11,734	13,495	53,178
Total Forecasted Licensing Revenue	<u>\$129,696</u>	<u>\$140,399</u>	<u>\$75,204</u>	<u>\$80,387</u>	<u>\$88,567</u>	<u>\$98,091</u>	<u>\$108,660</u>	<u>\$721,004</u>
<i>Java ME Licensing YoY Growth</i>	<i>n/a</i>	<i>8.3%</i>	<i>-46.4%</i>	<i>6.9%</i>	<i>10.2%</i>	<i>10.8%</i>	<i>10.8%</i>	<i>n/a</i>

**Notes:**

[1] OAGOOGL0100164541.

See "Strategic Forecast" scenario, at p. 3, for 2009-2010 forecasts. I have assumed that Java ME means licensing and possibly access fee revenue.

[2] OAGOOGL0000702509.

[3] OAGOOGL0000702677.

[4] OAGOOGL0002809491.

[5] 2015 estimated using growth rate from 2013 to 2014.

Oracle America, Inc. v. Google, Inc.

**ORACLE JAVA FINANCIALS, 2011-2015 [1]**

Exhibit 12.6

<i>(in thousands)</i>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>	<u>2015</u>	<u>Total</u>
Java Licensing						
Revenue	\$250,194	\$285,100	\$316,061			\$1,206,853
Expense	25,061	27,947	30,037			139,812
<i>Expense as a % of Revenue</i>	<i>10.0%</i>	<i>9.8%</i>	<i>9.5%</i>			<i>11.6%</i>
Margin	<u>\$225,133</u>	<u>\$257,153</u>	<u>\$286,024</u>			<u>\$1,067,040</u>
<i>Margin as a % of Revenue</i>	<i>90.0%</i>	<i>90.2%</i>	<i>90.5%</i>			<i>88.4%</i>
Java Consulting						
Revenue	\$4,616	\$7,808	\$6,755			\$26,822
Expense	7,775	6,745	6,286			28,915
<i>Expense as a % of Revenue</i>	<i>168.4%</i>	<i>86.4%</i>	<i>93.1%</i>			<i>107.8%</i>
Margin	<u>-\$3,159</u>	<u>\$1,063</u>	<u>\$469</u>			<u>-\$2,093</u>
<i>Margin as a % of Revenue</i>	<i>-68.4%</i>	<i>13.6%</i>	<i>6.9%</i>			<i>-7.8%</i>
Java Total						
Revenue	\$254,810	\$292,908	\$322,816			\$1,233,675
Expense	32,836	34,692	36,323			168,727
<i>Expense as a % of Revenue</i>	<i>12.9%</i>	<i>11.8%</i>	<i>11.3%</i>			<i>13.7%</i>
Margin	<u>\$221,974</u>	<u>\$258,216</u>	<u>\$286,493</u>			<u>\$1,064,947</u>
<i>Margin as a % of Revenue</i>	<i>87.1%</i>	<i>88.2%</i>	<i>88.7%</i>			<i>86.3%</i>

**Notes:**

[1] OAGOOGL2000003713.

*Oracle America, Inc. v. Google, Inc.*

**SUN MICROSYSTEMS, INC. 2006 JAVA ME PROFIT & LOSS [1]**

Exhibit 12.7

	<u>Q1</u>	<u>Q2</u>	<u>Q3</u>	<u>Q4</u>	<u>2006</u>
Revenue	\$22,210	\$22,838	\$25,050	\$28,151	\$98,249
COGS	1,408	1,710	2,161	2,171	7,450
<i>COGS as a % of Revenue</i>	<i>6.3%</i>	<i>7.5%</i>	<i>8.6%</i>	<i>7.7%</i>	<i>7.6%</i>
Gross Profit	20,802	21,128	22,889	25,980	90,799
<i>Gross Profit as a % of Revenue</i>	<i>93.7%</i>	<i>92.5%</i>	<i>91.4%</i>	<i>92.3%</i>	<i>92.4%</i>
Engineering	7,845	8,859	7,506	8,631	32,841
Marketing	3,497	4,052	4,052	3,682	15,283
Sales	2,221	2,284	2,505	2,815	9,825
<i>Sales as a % of Revenue</i>	<i>10%</i>	<i>10%</i>	<i>10%</i>	<i>10%</i>	<i>10%</i>
Total Operating Expenses	13,563	15,195	14,063	15,128	57,949
Contribution Margin	<u>\$7,239</u>	<u>\$5,933</u>	<u>\$8,826</u>	<u>\$10,852</u>	<u>\$32,850</u>
<i>Contribution Margin as a % of Revenue</i>	<i>32.6%</i>	<i>26.0%</i>	<i>35.2%</i>	<i>38.5%</i>	<i>33.4%</i>

**Notes:**

[1] OAGOOGL0005039944 - 962, at 946.

Oracle America, Inc. v. Google, Inc.

**JAVA CLIENT P&L/FORECAST, 2007-2014 [1]**

Exhibit 12.8

<i>(in millions)</i>	<b>Actual 2007</b>	<b>Actual 2008</b>	<b>Forecast 2009</b>	<b>Forecast 2010</b>	<b>Forecast 2011</b>	<b>Forecast 2012</b>	<b>Forecast 2013</b>	<b>Forecast 2014</b>	<b>Total</b>
Java Client									
Product Billings (Distribution)	\$189	\$177	\$170	\$190	\$219	\$257	\$302	\$350	\$1,854
Distribution	30	43	80	80	80	80	80	80	553
Total Product Billings	219	220	250	270	299	337	382	430	2,407
Total Services	-	-	-	-	-	-	-	-	-
YoY Growth	<i>n/a</i>	1.0%	13.6%	8.0%	10.7%	12.7%	13.4%	12.6%	<i>n/a</i>
Total	219	220	250	270	299	337	382	430	2,407
Cost of Goods Sold	20	19	29	29	35	40	44	50	266
Cost of Goods Sold as a % of Billings	9.1%	8.6%	11.6%	10.7%	11.7%	11.9%	11.5%	11.6%	11.1%
Product Gross Margin	199	201	221	241	264	297	338	380	2,141
Product Gross Margin as a % of Billings	90.9%	91.4%	88.4%	89.3%	88.3%	88.1%	88.5%	88.4%	88.9%
RDE	142	117	122	122	122	121	122	122	990
RDE as a % of Billings	64.8%	53.2%	48.8%	45.2%	40.8%	35.9%	31.9%	28.4%	41.1%
Contribution Margin	\$57	\$84	\$99	\$119	\$142	\$176	\$216	\$258	\$1,151
Contribution Margin % of Billings	26.0%	38.2%	39.6%	44.1%	47.5%	52.2%	56.5%	60.0%	47.8%

**Notes:**

[1] OAGOOGL0003973858.

*Oracle America, Inc. v. Google, Inc.*

**SUMMARY OF JAVA LICENSING OPERATING COSTS, 2013-2015 [1]**

Exhibit 12.9

<i>(in thousands)</i>	2013	2014	2015	Total
Revenue	\$315,997			\$671,454
Salaries	12,994			39,726
Commissions/Bonus	7,382			19,480
Benefits	3,889			11,679
Travel and Entertainment	2,646			6,359
Total Employee Related Expense	26,910			77,244
Documentation and Media	2			15
Facilities	971			3,071
Profess and Recruiting Fees	225			370
Miscellaneous	-158			83
Third Party Royalties and Referral Fees	0			0
Computers, Voice and Data	506			1,385
Marketing Communications	1,487			4,026
External Contractor Costs	51			47
COGS	1			1
New - Support Services Cost	4			5
Resource Sharing Expense	0			0
Eng Projects/Tooling /NRE	43			45
Total Other Operating Expenses	3,131			9,048
Total Operating Expense	\$30,041			\$86,292
<i>Operating Expense as a % of Revenue</i>	<i>9.5%</i>			<i>12.9%</i>

**Notes:**

[1] OAGOOGL2000003715, tab 'OPEX and License Trend by Qtr'.

*Oracle America, Inc. v. Google, Inc.*

**JAVA ME MARGINS, 2005-2011 [1]**

Exhibit 12.10

	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011 [2]</u>	<u>Total</u>
Total Java ME Billings	\$51,372,066	\$90,079,950	\$109,853,211	\$99,196,919	\$97,654,250	\$95,514,722	\$12,353,593	\$556,024,711
Total Java ME Costs	<u>18,076,254</u>	<u>19,646,798</u>	<u>23,674,253</u>	<u>22,177,130</u>	<u>21,196,439</u>	<u>21,661,190</u>	<u>2,848,732</u>	<u>129,280,795</u>
<i>Java ME Costs as a % of Billings</i>	<i>35.2%</i>	<i>21.8%</i>	<i>21.6%</i>	<i>22.4%</i>	<i>21.7%</i>	<i>22.7%</i>	<i>23.1%</i>	<i>23.3%</i>
<i>YoY Java ME Billings Growth</i>	<i>n/a</i>	<i>75.3%</i>	<i>22.0%</i>	<i>-9.7%</i>	<i>-1.6%</i>	<i>-2.2%</i>	<i>n/a</i>	<i>n/a</i>
Java ME Margin	<u>\$33,295,812</u>	<u>\$70,433,152</u>	<u>\$86,178,958</u>	<u>\$77,019,789</u>	<u>\$76,457,811</u>	<u>\$73,853,532</u>	<u>\$9,504,862</u>	<u>\$426,743,916</u>
<i>Java ME Margin as a % of Billings</i>	<i>64.8%</i>	<i>78.2%</i>	<i>78.4%</i>	<i>77.6%</i>	<i>78.3%</i>	<i>77.3%</i>	<i>76.9%</i>	<i>76.7%</i>

**Notes:**

[1] OAGOOGL0100167800.

[2] The data for 2011 only covers the first two months of the year.

*Oracle America, Inc. v. Google, Inc.***WORLDWIDE AND U.S. AVERAGE QUARTERLY ANDROID ACTIVE DEVICES, 2011 TO Q3 2015 [1]**

Exhibit 13

<b>2011</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>
Worldwide				
1 Day Active	n/a	34,992,314	46,532,375	65,362,805
7 Day Active	n/a	39,765,306	53,137,135	75,183,084
30 Day Active	n/a	43,861,343	59,043,833	83,439,479
U.S.				
1 Day Active	n/a	33,438,657	38,218,747	43,927,623
7 Day Active	n/a	35,345,233	40,643,609	47,391,673
30 Day Active	n/a	38,213,405	44,346,758	51,831,126
<b>2012</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>
Worldwide				
1 Day Active	92,873,866	119,842,961	159,626,230	210,592,088
7 Day Active	106,314,674	137,733,862	185,162,807	243,188,891
30 Day Active	118,149,476	153,590,819	208,481,616	271,752,550
U.S.				
1 Day Active	51,887,807	56,122,314	61,244,147	66,580,660
7 Day Active	55,761,712	60,620,460	66,412,093	72,368,792
30 Day Active	61,288,888	66,939,863	73,781,260	80,533,480

*Oracle America, Inc. v. Google, Inc.***WORLDWIDE AND U.S. AVERAGE QUARTERLY ANDROID ACTIVE DEVICES, 2011 TO Q3 2015 [1]**

Exhibit 13

<b>2013</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>
Worldwide				
1 Day Active	273,008,213	327,418,816	389,229,940	462,970,777
7 Day Active	315,358,630	379,862,824	454,640,556	540,439,669
30 Day Active	352,417,625	425,955,145	513,855,987	609,728,349
U.S.				
1 Day Active	74,186,714	79,154,177	84,086,912	89,630,226
7 Day Active	80,798,867	86,481,545	92,101,347	98,096,607
30 Day Active	90,182,817	96,623,684	103,506,196	109,462,499
<b>2014</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>
Worldwide				
1 Day Active	549,718,992	623,311,089	698,794,200	777,210,624
7 Day Active	644,423,936	732,828,044	825,638,442	920,308,003
30 Day Active	729,626,040	832,458,580	944,999,606	1,052,499,975
U.S.				
1 Day Active	99,336,915	103,794,363	107,189,544	113,277,086
7 Day Active	109,400,723	115,014,584	118,818,874	125,216,654
30 Day Active	122,891,172	130,686,992	134,773,832	141,489,790

*Oracle America, Inc. v. Google, Inc.*

**WORLDWIDE AND U.S. AVERAGE QUARTERLY ANDROID ACTIVE DEVICES, 2011 TO Q3 2015 [1]**

Exhibit 13

<b>2015</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>
Worldwide				
1 Day Active	819,679,543	882,831,753	935,564,392	n/a
7 Day Active	982,791,460	1,067,157,974	1,128,226,129	n/a
30 Day Active	1,145,798,487	1,227,717,446	1,313,689,665	n/a
U.S.				
1 Day Active	121,790,857	124,487,408	128,122,166	n/a
7 Day Active	135,166,407	138,511,580	143,030,896	n/a
30 Day Active	153,394,387	157,579,560	164,020,710	n/a

**Notes:**

[1] GOOG-00022382, all figures are quarterly averages.

*Oracle America, Inc. v. Google, Inc.*

**COMPARATIVE ANALYSIS: SEARCH TAC PAID TO "DISTRIBUTION PARTNERS"**

Exhibit 14

<i>(in millions)</i>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>
Google Total AdWords TAC [1]	\$1,332.7	\$1,864.5	\$2,638.1	████████
TAC Paid to "Non-Android Mobile O.S. Partners" [2]	████████	████████	████████	████████
Google Total TAC Paid to Distribution Partners [3]	1,517.0	2,165.0	2,965.0	3,633.0

**Notes:**

[1] Exhibit 7.4 (Created February 29, 2016).

[2] Exhibit 14.1 + Exhibit 14.2.

[3] Google 2013 Form 10-K, p. 61; Google 2014 Form 10-K, p. 52.

*Oracle America, Inc. v. Google, Inc.*

**COMPARATIVE ANALYSIS: SEARCH TAC PAID TO "DISTRIBUTION PARTNERS" - MOBILE DEVICES**

Exhibit 14.1

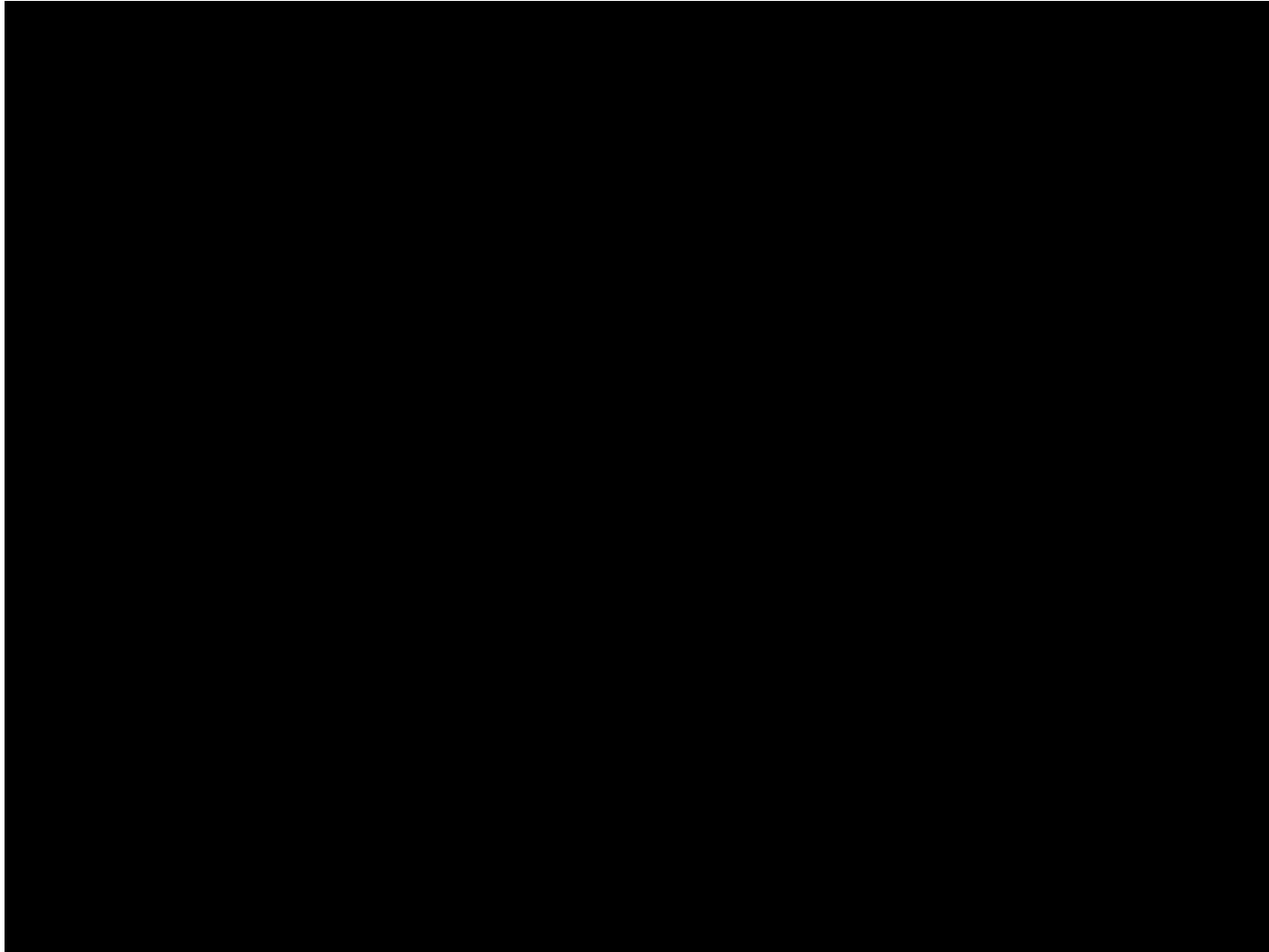
Partner	Year	Google Reported Mobile Revenue	% Paid to Provider	% Retained by Google	Imputed Total Shared Revenue	TAC Payments to Non-Android Partners

*Oracle America, Inc. v. Google, Inc.*

**COMPARATIVE ANALYSIS: SEARCH TAC PAID TO "DISTRIBUTION PARTNERS" - MOBILE DEVICES**

Exhibit 14.1

Partner	Year	Google Reported Mobile Revenue	% Paid to Provider	% Retained by Google	Imputed Total Shared Revenue	TAC Payments to Non-Android Partners
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*Oracle America, Inc. v. Google, Inc.*

**COMPARATIVE ANALYSIS: SEARCH TAC PAID TO "DISTRIBUTION PARTNERS" - MOBILE DEVICES**

Exhibit 14.1

Partner	Year	Google Reported Mobile Revenue	% Paid to Provider	% Retained by Google	Imputed Total Shared Revenue	TAC Payments to Non-Android Partners
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**Notes:**

[1] Case No. CV 10-03561 WHA, Response to Docket No. 1436, entitled:

“Google Search Distribution Agreements with Non-Android Mobile Operating System Partners.”

*Oracle America, Inc. v. Google, Inc.*

**COMPARATIVE ANALYSIS: SEARCH TAC PAID TO "DISTRIBUTION PARTNERS" - NON-MOBILE (DESKTOP) [1]**

Exhibit 14.2

Partner	Year	Google Reported Desktop Revenue	% Paid to Provider	% Retained by Google	Imputed Total Shared Revenue	TAC Payments to Non-Android Partners

**Notes:**

[1] Case No. CV 10-03561 WHA, Response to Docket No. 1436, entitled:

“Google Search Distribution Agreements with Non-Android Mobile Operating System Partners.”

*Oracle America, Inc. v. Google, Inc.***SUMMARY OF GOOGLE PRESENTATIONS TO OEMS AND CARRIERS IN WHICH JAVA IS MENTIONED**

Exhibit 15

Bates Number	Title	Parties	Date	Java Related Aspects of Document
GOOGLE-24-00147891	The Google Phone	Google, T-Mobile	Nov-06	<p>Slide 6: Mobile Applications: J2ME</p> <p>Slide 33: Baseline Features - support for J2ME, CDC1.1, MIDP and JSRs</p> <p>Slide 39: Supporting Java is the best way to harness developers:</p> <p>The wireless industry has adopted Java, and the carriers require its support.</p> <p>Strategy: Leverage Java for its existing base of developers. Build a useful app framework (not J2ME).</p> <p>Support J2ME apps in compatibility mode. Provide an opT-Mobileized JVM (Dalvik).</p> <p>Slide 40: Runtime includes: Core Java Libs, Java Virtual Machine</p> <p>Slide 49: Graphics architecture – Applications (Java/C++), Java API</p> <p>Slide 56: Application level Java interface to telephony sub-system</p> <p>Slide 59: Runs standard Java .class/.jar files</p> <p>Slide 60: Standard Java class libraries</p> <p>Slide 68: Content Providers - Java API for application access to SQLite backend</p> <p>Slide 71: Developer tools – Eclipse, Native/Java IDE and debugging; Java debugging</p> <p>Slide 73: Java application framework and model implemented and sufficient for app development</p> <p>Slide 77: Time frame</p>
GOOGLE-24-00010460	Google Powered Phone	Google, Sprint	Apr-07	<p>Slide 9: Platform references JVM</p> <p>Slide 31: Developer tools – Eclipse, Native/Java IDE and debugging; Java debugging</p> <p>Slide 42: Promotional rate plan pricing for Google to incentivize carriers</p> <p>Slide 43: Price protection</p> <p>Slide 48: JVM for middleware and apps</p> <p>Slide 49: Android Advantages – powerful, simple Java application framework</p> <p>Slide 50: Runtime includes: Core Java Libs, Java Virtual Machine</p> <p>Slide 55: Graphics architecture – Applications (Java/C++), Java API</p> <p>Slide 61: Media Framework: Advanced framework with simple Java API layer</p> <p>Slide 63: Application level Java interface to telephony sub-system</p> <p>Slide 65: Runs standard Java .class/.jar files</p> <p>Slide 66: Standard Java class libraries</p> <p>Slide 73: Java API for application access to SQLite backend</p> <p>Slide 77: Developer tools – Eclipse, Native/Java IDE and debugging; Java debugging</p>
GOOGLE-24-00015101	A Google Enabled Phone	Google, Telefonica	9-May-07	<p>Slide 5: Platform references JVM</p> <p>Slide 7: Google enabled phone proposition – low acquisition cost, high end data customers</p> <p>Slide 18: Developer tools – Eclipse, Native/Java IDE and debugging; Java debugging</p> <p>Slide 25: JVM for middleware and apps</p> <p>Slide 26: Android Advantages – powerful, simple Java application framework</p> <p>Slide 27: Runtime includes: Core Java Libs, Java Virtual Machine</p> <p>Slide 32: Graphics architecture – Applications (Java/C++), Java API</p> <p>Slide 38: Media Framework: Advanced framework with simple Java API layer</p> <p>Slide 40: Application level Java interface to telephony sub-system</p> <p>Slide 42: Runs standard Java .class/.jar files</p> <p>Slide 43: Standard Java class libraries</p> <p>Slide 50: Java API for application access to SQLite backend</p> <p>Slide 54: Developer tools – Eclipse, Native/Java IDE and debugging; Java debugging</p>

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<b>Bates Number</b>	<b>Title</b>	<b>Parties</b>	<b>Date</b>	<b>Java Related Aspects of Document</b>
GOOGLE-24-00015413	A Google Enabled Phone	Google, Orange	10-May-07	<p>Slide 5: Platform references JVM</p> <p>Slide 7: Google enabled phone proposition – low acquisition cost, high end data customers</p> <p>Slide 18: Developer tools – Eclipse, Native/Java IDE and debugging; Java debugging</p> <p>Slide 25: JVM for middleware and apps</p> <p>Slide 26: Android Advantages – powerful, simple Java application framework</p> <p>Slide 27: Runtime includes: Core Java Libs, Java Virtual Machine</p> <p>Slide 32: Graphics architecture – Applications (Java/C++), Java API</p> <p>Slide 38: Media Framework: Advanced framework with simple Java API layer</p> <p>Slide 40: Application level Java interface to telephony sub-system</p> <p>Slide 42: Runs standard Java .class/.jar files</p> <p>Slide 43: Standard Java class libraries</p> <p>Slide 50: Java API for application access to SQLite backend</p>
GOOGLE-24-00019558	A Google Enabled Phone	Google, Vodafone	Jan-07	<p>Slide 2: Release 1 product; Release 2 opportunity – VF customization; LiMo and Google Alliance</p> <p>Slide 6: Platform includes JVM</p> <p>Slide 7: VF knows mobile; Google knows the internet</p> <p>Slide 8: VF customer in exchange for Google's handset and integrated services – low acquisition cost, high end data customers</p> <p>Slide 12: Market launch components</p> <p>Slide 17: Developer tools – Eclipse, Native/Java IDE and debugging; Java debugging</p> <p>Slide 25: JVM for middleware and apps</p> <p>Slide 26: Android Advantages – powerful, simple Java application framework</p> <p>Slide 27: Runtime includes: Core Java Libs, Java Virtual Machine</p> <p>Slide 32: Graphics architecture – Applications (Java/C++), Java API</p> <p>Slide 38: Media Framework: Advanced framework with simple Java API layer</p> <p>Slide 40: Application level Java interface to telephony sub-system</p> <p>Slide 42: Runs standard Java .class/.jar files</p> <p>Slide 43: Standard Java class libraries</p> <p>Slide 50: Content Providers - Java API for application access to SQLite backend</p> <p>Slide 54: Developer tools – Eclipse, Native/Java IDE and debugging; Java debugging</p>

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Bates Number	Title	Parties	Date	Java Related Aspects of Document
GOOGLE-24-00206924	The Google Phone	Google, Sprint	Dec-06	<p>Slide 5: 200 million PC's sold each year; 1 billion mobile phones</p> <p>Slide 10: Platform including JVM</p> <p>Slides 18-24: Sprint content integration, partnership economics; reduce price of handset/data service and increase internet penetration of consumer segment</p> <p>Slide 29: Developer tools - Eclipse, Native/Java IDE and debugging; Java debugging</p> <p>Slide 39: Promotional rate plan</p> <p>Slide 46: Project Android - Java virtual machine for middleware and apps</p> <p>Slide 47: Android Advantages - Powerful, simple Java Application Framework</p> <p>Slide 48: Runtime includes: Core Java Libs, Java Virtual Machine</p> <p>Slide 53: Graphics architecture – Applications (Java/C++), Java API</p> <p>Slide 61: Telephony Manager - Application level Java interface to telephony sub-system</p> <p>Slide 63: Dalvik Runtime - Runs standards Java .class/.jar files</p> <p>Slide 64: Application Framework: Standard Java class libraries</p> <p>Slide 71: Content Providers - Java API for application access to SQLite backend</p> <p>Slide 75: Developer Tools - Eclipse, Native/Java IDE and debugging; Java debugging</p>
GOOGLE-59-00014898	The Google Phone	Google, Cingular	Dec-06	<p>Slide 6: Seamless Experience Between Device, UI &amp; Applications: JVM in Platform</p> <p>Slide 17: Developer tools – Eclipse, Native/Java IDE and debugging; Java debugging</p> <p>Slide 44: Project Android: JVM for Middleware and apps</p> <p>Slide 45: Android Advantages: Powerful, simple Java Application Framework</p> <p>Slide 46: Android Stack: Core Java Libraries, JVM</p> <p>Slide 51: Graphics Architecture: Java Applications, Java API</p> <p>Slide 59: Telephony Manager - Application level Java interface to telephony sub-system</p> <p>Slide 61: Runs standards Java .class/.jar files</p> <p>Slide 62: Application Framework: Standard Java class libraries</p> <p>Slide 69: Content Providers - Java API for application access to SQLite backend</p> <p>Slide 73: Developer Tools - Eclipse, Native/Java IDE and debugging; Java debugging</p>
GOOGLE-01-00025576	Open Handset Platform	Google, China Mobile	28-Sep-06	<p>Slide 6: Telephony API's support multiple semiconductor architectures</p> <p>Slide 7: Google &amp; [Open Handset] Alliance will make the integrated Java/Linux Mobile platform available through an open source distribution; The Java platform will be CDC based with the ability to run all the midlet-base content</p> <p>Slide 9: Supporting Java is the best way to harness developers – integrate class libraries and other technology from Skelmir acquisition to accelerate effort</p> <p>Slide 11: Pitch to China Mobile – Google invites China Mobile to be one of the first carriers to embrace an open OS and make a significant impact on the mobile industry ....</p> <p>Slide 12: Google handset OS architecture including Core Java Libraries and JVM</p>

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Bates Number	Title	Parties	Date	Java Related Aspects of Document
GOOGLE-29-00002088	Open Handset Distribution	Google, DoCoMo	9-Apr-07	Slide 4: Java Application Framework “Blazingly fast Java implementation” Slide 5: Android Stack: Core Java Libraries, JVM Slide 6: Open platform allows thousands of Java developer to easily create unique applications Slide 20: Project Android: JVM for Middleware and apps Slide 21: Android Stack: Core Java Libraries, JVM Slide 26: Graphics architecture – Applications (Java/C++), Java API Slide 32: Media Framework - Advanced framework with simple Java API layer Slide 34: Telephony Manager - Application level Java interface to telephony sub-system Slide 36: Runs standards Java .class/.jar files Slide 37: Application Framework: Standard Java class libraries Slide 44: Content Providers - Java API for application access to SQLite backend
GOOGLE-56-00018960	Google Project	Google, Samsung		Samsung sent Google a Questionnaire expressing concern for Java support: Page 2: How to test Java Runtime? Page 4: We need to have a technical session regarding the software architecture: Windows system, multimedia framework, Dalvik JVM, and other subjects on Resource isolation/management mechanism, multiple VM mechanism, JIT mechanism, and Java libraries
GOOGLE-24-00152227	Project Android	Google, LG		Slide 2: Project Android: Java virtual machine for middleware and apps Slide 3: Android Advantages: Powerful, simple Java Application Framework Slide 7: Android stack with Core Java libraries and Java virtual machine Slide 13: Graphics Architecture with Java API Slide 20: Telephony Manager: Application level Java interface to telephony sub-system Slide 23: Dalvik Runtime: Runs standard Java.class/.jar files Slide 33: Content Providers - Java API for application access to SQLite backend Slide 42: Developer Tools - Eclipse, Native/Java IDE and debugging; Java debugging
GOOGLE-24-00013099	Android: BenQ Technical Overview	Google, BenQ	2006	BenQ – Taiwanese consumer electronics company Slide 7: Java J2ME and CDC1.1; JSRs listed Slide 13: Supporting Java is the best way to harness Java developers Slide 14: Android Architecture - Core Java libraries and JVM Slide 23: Graphics Architecture with Java API Slide 30: Telephony Manager: Application level Java interface to telephony sub-system Slide 33: Dalvik Runtime: Runs standard Java.class/.jar files Slide 34: Application Framework: Standard Java class libraries Slide 42: Content Providers - Java API for application access to SQLite backend Slide 45: Developer Tools - Eclipse, Native/Java IDE and debugging; Java debugging Slide 47: Platform Status – reference to JVM and Java application framework Slide 51: Schedule

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Bates Number	Title	Parties	Date	Java Related Aspects of Document
GOOGLE-03-00067085	Android Project: Software Functional Requirements Document for Release 1.0	Google, HTC	6-Apr-07	<p>Page 20: 4.1.2 – Since the product is built using native (C/C++) and managed (Java) code, there are two separate methods of debugging.</p> <p>Page 32: 7.2 Platform - The Dalvik runtime will support a subset of the core library APIs present in Java Platform, Standard Edition (J2SE) 1.5</p> <p>Page 33: 7.5.1 Debugging - The Java Debug Wire Protocol (JDWP) is a protocol used for communication between a debugger and the JVM; 7.5.2 JNI - The JNI is a programming framework that allows Java code running in the JVM to call and be called by native code written in other languages, such as C, C++, and assembly.</p> <p>Page 34: MIDP</p> <p>Page 35: The application framework will be written in the Java language, running under Dalvik runtime</p>
GOOGLE-17-00030541	Android Project: Software Functional Requirements Document for Release 1.0	Google	10-Sep-08	<p>Page 21: 4.1.2 – Since the product is built using native (C/C++) and managed (Java) code, there are two separate methods of debugging.</p> <p>Page 33: 7.1 Overview and 7.2 Platform – list of all supported J2SE libraries</p> <p>Additional APIs, JNI – programming framework that allows Java code running in the JVM to be called by native code written in other languages, such as C, C++ and assembly.</p> <p>Page 34: MIDP</p> <p>Page 35: The application framework will be written in the Java language, running under Dalvik runtime</p>
GOOGLE-22-00072076	Android Project: Software Functional Requirements Document for Release 1.0	Google, Asus	6-Apr-07	<p>Page 20: 4.1.2 – Since the product is built using native (C/C++) and managed (Java) code, there are two separate methods of debugging.</p> <p>Page 32: 7.1 Overview and 7.2 Platform – list of all supported J2SE libraries</p> <p>Page 33: Additional APIs, JNI – programming framework that allows Java code running in the JVM to be called by native code written in other languages, such as C, C++ and assembly.</p> <p>Page 34: MIDP</p> <p>Page 35: The application framework will be written in the Java language, running under Dalvik runtime</p>
GOOGLE-22-00073880	Android Project: Software Functional Requirements Document for Release 1.0	Google, Marvell	6-Apr-07	<p>Page 20: 4.1.2 – Since the product is built using native (C/C++) and managed (Java) code, there are two separate methods of debugging.</p> <p>Page 32: 7.1 Overview and 7.2 Platform – list of all supported J2SE libraries</p> <p>Page 33: Additional APIs, JNI – programming framework that allows Java code running in the JVM to be called by native code written in other languages, such as C, C++ and assembly.</p> <p>Page 34: MIDP</p> <p>Page 35: The application framework will be written in the Java language, running under Dalvik runtime</p>

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Bates Number	Title	Parties	Date	Java Related Aspects of Document
GOOGLE-22-00122689	Android Project: Software Functional Requirements Document for Release 1.0	Google, STK	6-Apr-07	<p>Page 20: 4.1.2 – Since the product is built using native (C/C++) and managed (Java) code, there are two separate methods of debugging.</p> <p>Page 32: 7.1 Overview and 7.2 Platform – list of all supported J2SE libraries</p> <p>Page 33: Additional APIs, JNI – programming framework that allows Java code running in the JVM to be called by native code written in other languages, such as C, C++ and assembly.</p> <p>Page 34: MIDP</p> <p>Page 35: The application framework will be written in the Java language, running under Dalvik runtime</p>
GOOGLE-22-00124385	Android Project: Software Functional Requirements Document for Release 1.0	Google, HTC	6-Apr-07	<p>Page 20: 4.1.2 – Since the product is built using native (C/C++) and managed (Java) code, there are two separate methods of debugging.</p> <p>Page 32: 7.1 Overview and 7.2 Platform – list of all supported J2SE libraries</p> <p>Page 33: Additional APIs, JNI – programming framework that allows Java code running in the JVM to be called by native code written in other languages, such as C, C++ and assembly.</p> <p>Page 34: MIDP</p> <p>Page 35: The application framework will be written in the Java language, running under Dalvik runtime</p>
GOOGLE-56-00017330	Android Project: Software Functional Requirements Document for Release 1.0	Google, T-Mobile	7-May-07	<p>Page 20: 4.1.2 – Since the product is built using native (C/C++) and managed (Java) code, there are two separate methods of debugging.</p> <p>Page 32: 7.1 Overview and 7.2 Platform – list of all supported J2SE libraries</p> <p>Page 33: Additional APIs, JNI – programming framework that allows Java code running in the JVM to be called by native code written in other languages, such as C, C++ and assembly.</p> <p>Page 34: MIDP</p> <p>Page 35: The application framework will be written in the Java language, running under Dalvik runtime</p>
GOOGLE-22-00051824	Android Project: Software Functional Requirements Document for Release 1.0	Google, Borqs	6-Apr-07	<p>Page 20: 4.1.2 – Since the product is built using native (C/C++) and managed (Java) code, there are two separate methods of debugging.</p> <p>Page 32: 7.1 Overview and 7.2 Platform – list of all supported J2SE libraries</p> <p>Page 33: Additional APIs, JNI – programming framework that allows Java code running in the JVM to be called by native code written in other languages, such as C, C++ and assembly.</p> <p>Page 34: MIDP</p> <p>Page 35: The application framework will be written in the Java language, running under Dalvik runtime</p>
GOOGLE-01-00066237	Project Android	Google, LG		<p>Slide 4: Java virtual machine for middleware and apps</p> <p>Slide 5: Powerful, simple Java Application Framework</p> <p>Slide 9: Android stack with Core Java libraries and Java virtual machine</p> <p>Slide 15: Graphics Architecture with Java API</p> <p>Slide 22: Telephony Manager: Application level Java interface to telephony sub-system</p> <p>Slide 25: Dalvik Runtime: Runs standard Java.class/.jar files</p>

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Bates Number	Title	Parties	Date	Java Related Aspects of Document
GOOGLE-01-00066262	Project Android	Google, LG		Slide 4: Project Android: Java virtual machine for middleware and apps Slide 5: Android Advantages: Powerful, simple Java Application Framework Slide 9: Android stack with Core Java libraries and Java virtual machine Slide 15: Graphics Architecture with Java API Slide 22: Telephony Manager: Application level Java interface to telephony sub-system Slide 25: Dalvik Runtime: Runs standard Java.class/.jar files
GOOGLE-03-00139402	Project Android	Google, Asian OEM	2006	Slide 2: Project Android: Java virtual machine for middleware and apps Slide 3: Android Advantages: Powerful, simple Java Application Framework Slide 7: Android stack with Core Java libraries and Java virtual machine Slide 13: Graphics Architecture with Java API Slide 20: Telephony Manager: Application level Java interface to telephony sub-system Slide 23: Dalvik Runtime: Runs standard Java.class/.jar files Slide 25: Application Framework - Standard Java class libraries, MIDP 2.0 support Slide 33: Content Providers - Java API for application access to SQLite backend Slide 42: Developer Tools - Eclipse, Native/Java IDE and debugging; Java debugging
GOOGLE-03-00146539	Project Android Qualcomm Meeting	Google, Qualcomm	27-Mar-07	Slide 2: Project Android: Java virtual machine for middleware and apps Slide 3: Powerful, simple Java Application Framework Slide 4: Android stack with Core Java libraries and Java virtual machine Slide 9: Graphics Architecture with Java API Slide 16: Telephony Manager: Application level Java interface to telephony sub-system Slide 20: Dalvik Runtime: Java compatible, capable of hosting other languages; runs standard Java .class/.jar files
GOOGLE-03-00147537	Project Android Software Overview	Google, Qualcomm	May-07	Slide 2: Project Android: Java virtual machine for middleware and apps Slide 3: Powerful, simple Java Application Framework Slide 4: Android stack with Core Java libraries and Java virtual machine Slide 9: Graphics Architecture with Java API Slide 16: Telephony Manager: Application level Java interface to telephony sub-system Slide 20: Dalvik Runtime: Java compatible, capable of hosting other languages; runs standard Java .class/.jar files

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Bates Number	Title	Parties	Date	Java Related Aspects of Document
GOOGLE-81-00007497	Android Strategy Review	Google		<p>Slide 3: ARM optimized JVM; Java application framework and model implemented and sufficient for app development</p> <p>Slide 9: Open source the entire stack only after the first devices show up in the market; send a strong signal to the industry that they now have everything they need to build devices as-good-as or better than the ones just released</p> <p>Slide 10: Partnership choosing – a) pay partner, b) find another who values platform, c) pick a strong partner who needs Google</p> <p>Slide 19: Schedule, timing pressure</p> <p>Slide 29: Android Architecture: Core Java Libraries and JVM</p> <p>Slide 31: Platform Technical Overview - Powerful, simple Java Application Framework</p> <p>Slide 39: Graphics Architecture - Java applications, Java API</p> <p>Slide 46: Telephony - Application level Java interface to telephony sub-system</p> <p>Slide 49: Dalvik Runtime - Java compatible, capable of hosting other languages; Runs standard Java .class/.jar files</p> <p>Slide 50: Application Framework - Standard Java class libraries</p> <p>Slide 58: Content Providers - Java API for application access to SQLite backend</p> <p>Slide 61: Developer Tools - Eclipse, Native/Java IDE and debugging; Java debugging</p>
GOOGLE-17-00679502	Android	Google, Satyam		Slide 6: Android runtime modified to remove “Java” reference in core libraries
GOOGLE-01-00148180	[LarGe][MoM]CC of W719	Google	8-May-07	Hiroshi and Andy Rubin exchange: LG is interested in Java compatibility so they can support Vodafone and Vodafone live requirements (JSRs)
GOOGLE-38-00010714	Large Meeting Notes from LGE	Google, LG	20-Jul-06	<p>Page 4: Google is persuading carriers that Google is not a competitor; Google’s main goal is to make even market share among Yahoo, MS and Google; Google agreed not to open platform before first release with LGE</p> <p>Page 6: Schedule</p> <p>Page 7: “Please, confirm the Java issue. What will be the Java license issue without Sun? LGE needs more detail information about JSR support list”</p>
GOOGLE-56-00017329	Android Functional Requirements	Google	10-May-07	FRD cover email that Andy sent to T-Mobile in order to add T-Mobile functionality to baseline FRD
GOOGLE-56-00017401	Android Functional Requirements	Google, T-Mobile	25-Apr-07	T-Mobile discussion with Samsung; asking about Google services and relevant support
GOOGLE-29-00002087	Presentation for DoCoMo	Google	9-Apr-07	Cover email for pitch deck to get DoCoMo onboard
GOOGLE-22-00072075	Question About Multiple PDP Contexts	Google, Asus	11-Apr-08	Request from ASUSTeK for Google support for multiple PDP contexts
GOOGLE-22-00124382	Dream Application Data Sheet	Google, HTC	16-Oct-07	HTC wants to know what applications will be bundled into Dream.